Organic Margosa: An Agent of Biodynamic Agriculture

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

***Abstract*—** The present study is an effort to explore the concept of Biodynamic agriculture through sustainable routes. This communication is an amalgamation of secondary as well as primary data obtained through extensive preliminary survey and field research outputs respectively. Secondary data were collected from the published sources like websites, Journals, Articles, Research blogs, Newspapers and other editorial sources etc. To put forward the practice of Organic Agriculture, we are coming up with an Eco-friendly Nitrogen fertilizer saver known as Organic Margosa. Organic Margosa is a brown coloured finely crushed powder of *Azadirachta indica* (Neem) and *Pongamia pinnata* (Karanj). Field study on different Crop plants implementing Organic Margosa with chemical fertilizers increases the crop productivity coupled with more benefits that commensurates the eco-friendly agriculture practices through sustainable routes.

***Keywords*—**Organic Margosa, Biodynamic agriculture, Chemical fertilizers, *Azadirachta indica* (Neem) and *Pongamia pinnata* (Karanj).

I. Introduction

IMPACT on soil characteristics & climate; reduction in genetic-diversity; threat of GM crops; contamination of food; and decline in nutritive values etc., are the few problems allied with Conventional farming [1]. Table 1 represents the comparative Nutritional status of some selected crop plants. The tabular data reveals the need of accepting Organic food for not only environmental reasons but nutritional deficiency concerns also. Biodynamic agriculture is an upcoming potent alternative against this ecological hindrance caused by subsisted chemical agents. Biodynamic agriculture is a method of farming that aims to treat the farm as a living system which interacts with the environment, to build healthy, living soil and to produce food that nourishes and vitalizes and helps to develop mankind practices [2]. Organic farming through sustainable routes is a well defined putative practice in the field of Biodynamic agriculture.

Development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" is known as Sustainable development [3]. Concept of sustainable development relies on social, economic, environmental and institutional dimensions with three main goals i.e., environmental health, economic profitability, and social and economic equity [1]. Organic is an alternative way to overcome the problems of sustainability, global warming and food security (Charyulu and Biswas, 2010) [1]. A/c to Yadav (NCOF, GZB, GOI), Organic farming primarily aims at cultivating the land and raising crops in such a way, as to keep the soil alive (good health) by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) [2]. By 2030 the amount of carbon locked up in cropland soils, as soil organic matter from crop residues and manure, could rise by 50 percent if better management practices are introduced [4].

TABLE 1
COMPARISON BETWEEN ORGANIC VS CONVENTIONALLY FARMED VEGETABLES FOR THEIR NUTRITIONAL STATUS [5].

	Minerals (in milliequivalents)						
Vegetables Type of Soil Management	Calcium	Magnesium	Potassium	Sodium	Manganese	Iron	Copper
Snap Beans							
Organic	40.5	60.0	99.7	8.6	60.0	227.0	69.0
Conventional	15.5	14.8	29.1	0.0	2.0	10.0	3.0
Cabbage							
Organic	60.0	43.6	148.3	20.4	13.0	94.0	48.0
Conventional	17.5	15.6	53.7	0.8	2.0	20.0	0.4
Lettuce							
Organic	71.0	49.3	176.5	12.2	169.0	516.0	60.0
Conventional	16.0	13.1	53.7	0.0	1.0	1.0	3.0
Tomatoes							
Organic	23.0	59.2	148.3	6.5	68.0	1938.0	53.0
Conventional	4.5	4.5	58.6	0.0	1.0	1.0	0.0
Spinach							
Organic	96.0	293.9	257.0	69.5	117.0	1584.0	0.0
Conventional	47.5	46.9	84.0	0.8	1.0	19.0	0.5

In 2009, FAO, IFOAM and UNCTAD started the Global Organic Market Access (GOMA) project [2]. FAO attempts the harmonization of National Organic Standards, which is absolutely essential to increase International trade in Organic products [6]. On analysis of continent wise growth in Organic agriculture, Oceania topped with an area land of 17.32 million hectares followed by Europe with 11.46 million hectares (2013 data, FiBL-IFOAM Survey, 2015) (Fig. 1) [7].

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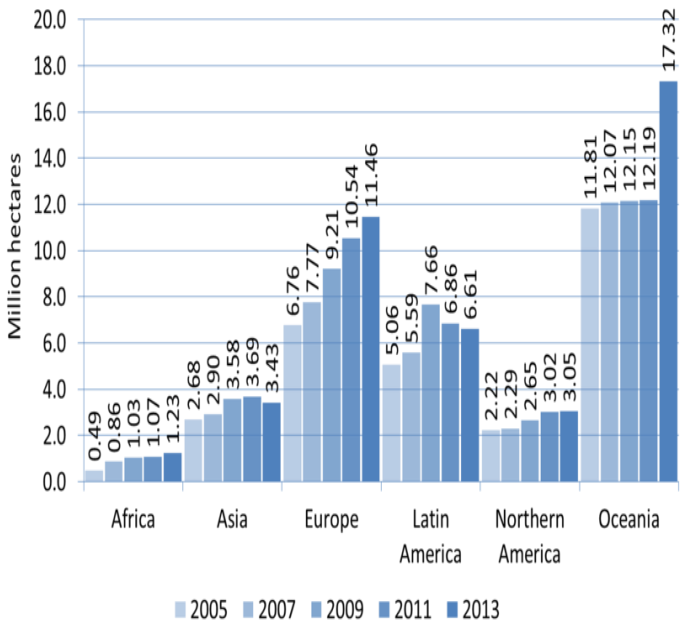

Fig. 1: Continent wise growth in Organic agriculture (2005-2013) [7].

A/c to Yadav (NCOF, GZB, GOI), The farmers of India and China are farmers of 40 centuries and it is organic farming that sustained them [2]. A comparison of Organic agriculture land area in India Vs the World is shown in Table 2. India stands first with maximum number of Organic producers in the world (Fig. 2). These all statistical representations clearly reflect the significant contribution of India as a potent practioner and contender of Biodynamic agriculture and Organic farming practices respectively.

TABLE II
ORGANIC AGRICULTURE LAND AREA IN INDIA VS THE WORLD (IN LAKHS HECTARES) [8].

YEAR	2009	2010	2011	2012
India	11.8	7.8	10.8	5.0
World	362.8	360.2	373.6	375.4

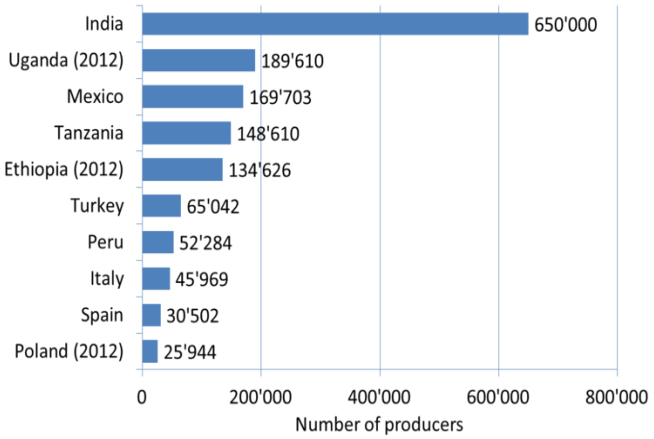

Fig. 2: Countries with the largest number of Organic producers as on 2012/2013 [7].

II. MATERIAL AND METHODOLOGY

Azadirachta indica, (Neem) and *Pongamia pinnata* (Karanj) are the key ingredients of Margosa. Neem manure augments the key nutrient contents in the in the soil [9]. Neem oils, extracts and cake, etc. are used as fertilizer, manure, compost, urea coating agent, soil conditioner [9] and effective in the management of approximately 200 insects, pests and nematodes [2]. *Pongamia pinnata* (Karanj) cake has been reported as useful organic manure, with insecticidal and anti-nematodal properties [10]. *Pongamia pinnata* is rich in Nitrogen and well known for controlling soil erosion, binding sand dunes and also act as "green manure" [11]. Application rates were standardized as per the outcomes of extensive field trials and vary from practice to practice like for nursery work, for plantation work, for lawn applications etc. However, for exclusive Organic farming 50 kg/hectare minimum basal dose of Organic Margosa can be used. Various Quality control parameters were standardized in order to test the efficacy of Margosa.

III. RESULT AND DISCUSSION

Chemical fertilizers are used frequently since the inception of Green revolution in lieu of higher productivity. Over application of chemical fertilizers raises environmental concerns due to their recalcitrating nature. Over application of major chemical field inputs also raises the question about their efficiency and efficacy. At present scenario, replacement of chemical fertilizers with complete organic inputs is a very challenging task. However, as an alternative to this, efforts can be made to introduce such type of botanical agents that can increase the bioavailability of these chemical inputs. We are coming up with an Organic composition known as Margosa in order to cater the above discussed issues. Organic Margosa increase the bioavailability of the chemical fertilizers, thus can reduce their excessive application in the agriculture field in lieu of higher productivity. Organic Margosa works with hydrophobic solid surface coating mechanism on granulated particles of chemical fertilizers like Urea and facilitates their slow release in soil. As a result, coated chemical fertilizers get maximum exposure time in the field, which putatively increase their bioavailability. With multidimensional benefits it is a highly economical proposition for the farming community at large [12]. Fig. 3 shows crop plants tested with margosa for their productivity (The testing was done at Agri. Res. Farm SHIATS Allahabad, India and Janta Vedic College Baraut, U.P., India (Kharif 2011 to Rabi 2012).

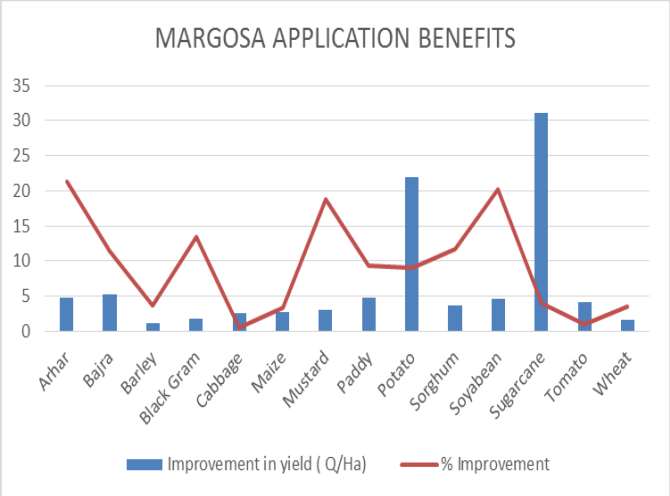

Fig. 3: Improvement in yield (Q/ha) of selected crops treated with Organic Margosa.

IV. CONCLUSION

Indian agriculture evolved principally as an ecologically sustainable approach using natural inputs for enhancing crop yield [13]. Organic Margosa introduced with an objective to promote sustainable agriculture practices. Productivity issues are always relies with Organic farming. However, Lower average yield in Organic farming (10-15% less than conventional farming) can be proportionate by its lower input costs and higher margins [13]. Therefore, efforts are required to integrate Organic farming with such technologies and practices that can overcome the various barriers associated with this. Organic Margosa is an effort in the same line to encourage Organic farming through sustainable routes. However, Organic farming at commercial acceptance level is on budding stage. Therefore more extensive research is required for its prompt exploration and acceptance on global level with propionate economical upbringings and separate market setup.

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