INTRODUCTION

Agriculture is the largest employment provider and plays a vital role in overall socio-economic development of India. In agro-ecosystem, the use of toxic synthetic fertilizer affects the water bodies, air, soil ecosystem, soil fertility and growth of cultivated crops. (Ignacimuthu and Vendan, 2007). Organic agriculture is a holistic system designed to optimize the productivity and enhances the agro-ecosystem, health, soil biological activity etc. Organic farming has emerged as an important priority area globally, in a view of growing demand for safe, more nutritious, healthy and environmental friendlier than conventionally grown foods (FAO, 2000; Saba and Messina, 2003).

Organic farming is helpful for the production of safe food at low cost. There are many components of organic farming, which can reduce the cost of production and ensure a clean environment. These include use of farmyard manure, biocompost, green manure, organic mulches, vermicomposts, algae and bio fertilizers, which can enrich the soil and support the crop growth and yield. Organic farming must be looked in the light of new scientific knowledge in all interrelated disciplines and not as a traditional agricultural practice of the past.

Nature warns human being that they must maintain to live in harmony with ‘Nature’. The chemical fertilizers and pesticides when applied in heavy doses particularly at a later stage of crop growth are absorbed by leaves, fruits, seeds and pollute the food commodities, thereby causing health hazards. Chemically grown foods have adversely affected human health all over the world. Most eminent natural source products are meant to be organic products which are highly great substitute to sustainable development. The concept of organic agriculture is receiving increased attention and organic food markets are also expanding rapidly in many countries including India (Alok, 2014). In recent days the use of different organic fertilizers, bio fertilizers and bio pesticides are being
recommended not only to minimize the use of hazardous chemical inputs but also for sustainable crop production.

Agro industrial wastes could be recycled by adopting simple and suitable techniques in compost making and preparing enriched manure. These improved technologies not only reduce the quantity but also improve the quality of compost with better plant nutrients (Jagadeesan, 2005). In India, as a step toward the expansion of native sources, the application of organic waste materials will be useful for achieving higher production in agriculture. India produces 3,000 million tons of agro waste every year. Recycling of organic wastes is a great challenge in developed and developing countries like India.

Disposal of agro-industrial wastes is a major problem in many industries. Dumping of industrial wastes causes environmental hazards. Recycling of industrial wastes is one way of disposal mechanism and another way of resource management. The application of organic manure could increase the soil fertility, productivity of the crops and produce safe food (Ramesh et al., 2005). Recycling of biowaste will also help to reduce environmental pollution arising out of accumulated biowastes (Kumar, 2005). Improper disposal of solid waste whether in open dumps, inactive landfill or active landfill that are inadequately engineered increases the risk of health in humans, causes damage to ecosystems and accelerates the destruction of the environment.

Agro-industrial wastes and byproducts are renewable forms of resources generated all over the world. Composting of organic materials from the solid waste not only provides a valuable benefit to nutrient deficient soil, but also increase in beneficial soil organisms, the suppression of certain plant diseases, the reduced need for fertilizers, pesticides and prevent the soil erosion. Corncob and coirpith are major agro-industrial waste in Tamil Nadu. This waste is value and should be used as feed straw, biofuel etc.

In India, maize cultivation is emerging as third most important crop after rice and wheat. In early 2000s, corn production was around 12 million tons which was peaked at present to 22 million tons. After harvesting the corn, central part of
the cob may be left in the field. The agro industrial waste corncob decomposes very slowly due to the high lignin (35%) and cellulose (34.45%) content. India currently produces over 15,000 million coconuts per year. In addition to the utilization of endosperm for edible purposes and extraction of oil, the outer non-edible fibrous portion of the nuts (coconut husk) is used for extracting coconut fibre or coir, which is commerciality utilized for making value-added products. Coir fiber extracted from the husk is used in local bedding, mat and matting, rubberized coir mattress, yarn and rope making etc. Coirpith contains lignin (30%) and cellulose (26%) complex, which do not degrade quickly but can be decomposed by employing the fungus Pleurotus sajor-caju. At the end of the composting period, coirpith is changed into a well decomposed black mass (Kannan et al., 2014). Coirpith is fluffy, spongy, material with significant water holding capacity. Coirpith has low density and thermal conductivity, better water holding capacity and better calorific value.

Agro-waste like corncob and coirpith are usually dumped on roadsides, when it is burnt, it does not burn completely but emits abundant smoke for several days polluting the environment. All these undesirable effects on soil, environment and loss of nutrients could be avoided by recycling the agro-waste through composting.

Biodegradation of this agro waste by mushroom spawn (Pleurotus sajor-caju) and earthworms (Eudrilus eugeniae) is generally considered to be a safe, effective and eco-friendly process. Selection of earthworm species is very important factor because only few species are able to survive and adjust to a particular type of environment. The exotic earthworm species namely Eudrilus eugeniae is commonly called African night crawler used for breaking down the organic waste and is capable of decomposing large quantities of organic materials into usable vermicompost Gopal et al. (2009).

Composting is a biological decomposition process that converts organic matter or a stable, humus like product under controlled conditions. Composting applications helps in controlling soil erosion and increase water holding capacity. Biocomposting is the non-thermophilic biodegradation of organic materials
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through the interaction between earthworms and microorganisms, where by organic material residuals are fragmented rapidly into much finer particles by passing them through a grinding gizzard while maintaining nutrients Sharma et al. (2005). The use of earthworms for waste management, organic matter stabilization, soil detoxification and vermicompost production has been well documented by several researchers (Kaviraj and Sharma 2003; Loh et al. 2005; Suthar 2006; Sakthivigneswari and Vijayalakshmi, 2016). Continuous use of inorganic fertilizers alone has been found to be harmful to both soil productivity and quality of production. There is more and more evidence that chemical-based fertilizers, herbicides and pesticides are extremely harmful to our health. Hence, the strongest argument in favor of organic farming is for the environmental benefit. So keeping all this in view the present study deals with the impact of biocompost on legumes soybean (Glycine max L. (Merill) Var. Co. 7 Soy 3), moth bean (Vigna aconitifolia (Jacq.) Marechal Var. TMV (mb) -1) and medicinal plants black nightshade (Solanum nigrum (L.) and yellow berried nightshade (Solanum surattense Burm. f.)

Legume seeds are important sources of nutrients and can serve as high quality dietary protein sources to meet nutrient requirements (Duranti, 2006). It can “fix” atmospheric nitrogen with the help of nodules. The nodules are the house of the microscopic rhizobium that convert atmospheric nitrogen to nitrate and ammonia that can be used by plants (Oldroyd et al., 2011). Leghaemoglobin is an oxygen carrier and a hemoprotein found in the nitrogen fixing root nodules of leguminous plants. It is produced by the legumes in response to the roots being infected by nitrogen – fixing bacteria called rhizobia as part of the symbiotic interaction between plants and bacterium.

Soybean, is an herbaceous plant belongs to the family Fabaceae (Plate - 1A). The soybean plant is usually an erect bush with woody stems and alternately arranged leaves. It is a leguminous oil seed crop having world-wide adaptation. It is commonly known as “golden bean” or “miracle crop” of 20th century as it is the richest source of protein, oils, amino acids and unsaturated fatty acids. The native of soybean is Eastern Asia. It is also one of the nature’s
most versatile and fascinating crop in the present farming system of Indian agriculture. Soybean is used for medicinal, food and beverage industries. Hence, soybean finds diverse utilities as industrially important crop.

PLATE – 1

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PLATE– 1A SOYBEAN (*Glycine max* L. (Merill) Var. Co 7 Soy 3)

PLATE– 1B MOTH BEAN (*Vigna aconitifolia* (Jacq.) Marechal Var. TMV (mb)-1)
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*Vigna aconitifolia* is commonly called as moth bean and mat bean (Plate-1B). It belongs to the family Fabaceae which grows up to maximum height of 50-60 cm. Moth bean is a wonderful short duration, drought resistant leguminous crop. It can grow well under minimum rain fall. Moth bean is protein rich and nutritious. Its plant biomass is used as a green and dry fodder for livestock. It is the ultimate choice of small and marginal farmers for sustained production under the extreme climatic conditions.

To cope up with the alarming situation, the recent exciting development of organically grown, medicinal plant based drugs has come as a boon. The natural pharmaceuticals are receiving importance and popularity as safe, efficacious and cost effective medicines with benefits due to secondary metabolites production. Medicinal plants are considered as gift of nature all around the world (Khalil *et al.*, 2007). *Solanum nigrum* is an important green leafy vegetable belongs to the family Solanaceae (Plate –2A). It is commonly known as black nightshade. It is rich in mineral salts like calcium, iron, vitamin A and vitamin C. The whole plant is used for medicinal purpose. In many parts of country, the root juice is used as medicine for asthma, whooping cough and liver diseases. It is used as diuretic, anti-inflammatory, laxative, anti-oxidative, antiulcerogenic and immune modulating ailments. Major active components are glycoalkaloids, glycoproteins and polysaccharides. It also contains polyphenolic compounds such as gallic acid, catechin, protocatechuic acid, caffeic acid, epicatechin, rutin and naringenin.

*Solanum surratense* is commonly known as yellow berried nightshade, Indian solanum or kandankathiri belongs to family Solanaceae is a potent medicinal plant (Plate–2B). It is widely distributed throughout India in dry situation as weed ascending to 1500 meters on the Himalayas, abundant by road sides and wastelands, mainly in Rajasthan, Gujarat, Madhya Pradesh, Uttar Pradesh and Haryana. It is having chemical constituents like solanocarpine, carpesterol, solanocarpidine, fatty acid, diosgenin, sitosterol, isochlorogenic acid, neochronogenic acid, chronogenic acid, caffeic acid, solasodine, solasonine, solamargine, quercetin, apigenin, histamine and acetylcholine. The fruits of plant are used as vegetable. They are also used in the treatment of cough, asthma,
PLATE-2

HABIT

PLATE – 2A BLACK NIGHTSHADE (Solanum nigrum L.)

PLATE – 2B YELLOW BERRIED NIGHTSHADE
(Solanum surratense Burm.f.)
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rheumatism and chest pain. It is also known to possess antibacterial, antifungal, antioxidant, hypoglycemic and larvicidal activities (Kannabiran et al., 2009).

The fertility of a soil is “its ability to provide nutrients in adequate amounts and in proper balance for the growth of the plants. For optimum growth production, a soil that enables deep rooting, provides aeration, has a good water holding capacity and consists of an adequate supply of plant nutrients is considered to be productive and fertile soil. Nitrogen (N), phosphorus (P) and potassium (K) are the three most important soil nutrients required for plant growth. Plants require sixteen elements, each of which has one or more special function in the plants growth and development.

Soil is the habitat of the diverse array of organisms which include both micro flora and fauna. Soil microorganisms play a very important role in soil fertility not only because of their ability to carry out biochemical transformation but also due to their importance as a source mineral nutrients. Soil enzyme are derived primarily from soil fungi, bacteria, plant roots, microbial cells, plant and animal residue and plays a significant role in mediating biochemical transformation involving organic residue decomposition and nutrient cycling in soil. A soil fairly rich in organic matter status will retain most of the residual nutrients and in due course the inherent fertility of the soil will be built – up appreciable so that it can support subsequent crops of very high yields.

Soils of India are mostly deficient in macro and micro nutrients. Nitrogen supply and nitrogen management are important factors in crop production. Another factor of concern is the significant environmental decline already associated with the injudicious use of the fertilizer nitrogen. This confirms the positive role of organic manure incorporation in increasing crop yield in sequence which commensurate with resultant increase in available soil macro and micro nutrients and crop productivity.

Antibacterial and antioxidant profile has been recognized to represent an important parameter to predict the impact of food on human health and it also affects the shelf life of the products. Many investigators obtained best results by
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using organic compost for several medicinal plants and aromatic plants on Mentha species (Khalil and El-Sherbeny, 2003), Hyasyamus muticus (Naguib and Aziz, 2004), Sidritis montana (El-Sherbeny et al., 2005) Andrographis paniculata (Vijaya et al. 2008; Bharat and Divya (2015).

Organic farming helps to improve the crop quality and reduces environmental pollution. It brightens the export of organic food items. It has the potential to transform agriculture as the main tool for natural conservation. The overall goal of waste management is to collect, treat and dispose the waste using the most economical means available. The success of the study will provide not only an alternate solution for the disposal of corncob and coirpith but also minimizes the application of chemical fertilizers to crops and encourage organic farming and sustainable crop production.

Keeping all this in view, a study was conducted to investigate the effect of biocomposted corncob and coirpith on the biometric, yield, biochemical, leghaemoglobin, antioxidant and antibacterial activities on soybean (Glycine max L. (Merill) Var. Co. 7 Soy 3), moth bean (Vigna aconitifolia (Jacq.) Marechal Var. TMV (mb)-1), black nightshade (Solanum nigrum L.) and yellow berried nightshade (Solanum surratense Burm.f.)

Objectives of the study

1. To monitor the effect of biocomposting of corncob and coirpith agro industrial wastes using the earth worm Eudrillus eugeniae and Pleurotus sajor-caju.

2. To count the microflora present in biocompost.

3. To analyze physico-chemical parameters of raw and composted corncob and coirpith.

4. To assess the effect of biocompost on the growth and productivity of the selected crops soybean, mothbean, black nightshade and yellow berried nightshade.
5. To study the leghaemoglobin content in the nodules grown in different treatments of agro wastes.

6. To estimate the protein and carbohydrate content in leaves and seeds of selected plants.

7. To study the antibacterial and antioxidant activity of the selected plants grown under best treatment.

8. To analyze the parameters of pre and post harvesting soil.