India being an agricultural country is very much dependent on the agricultural output for the growth of energy, economy and healthy environment. In other words we can say that the Indian economy is indirectly controlled by the agricultural production. It is therefore, the need of hour to apply the latest and well-suited agricultural practices, so that the economy of our country can be maintained at a higher steady state. Newly developed modern techniques, tools and chemical fertilizers leads to the so called ‘Green Revolution’. But the term of ‘green revolution’ seems to be old now as the continuos use of the chemical fertilizers had shown their negative effects on soil fertility, removal of organic matter, accumulation of salts, heavy metals and contamination of food, fodder and water. Therefore, it can be rightly said that chemical fertilizers leaded to environmental pollution and low yield per crop as a long-term effect. Organic farming as a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, insecticides, growth regulators and live stock additives (Magar, 2004) and is the best possible method for ‘Evergreen Revolution’.

Mechanization in modern agriculture has caused an acute shortage of live stock population, which decreased organic manure in the country. Organic manure such as compost farm yard manure, biofertilizers, press mud cake, etc. are the important source to
increase the soil organic matter content, soil microflora population and sustain agricultural production (Christopher Lourdraj, 2002). Although composting of organic wastes has been used since ancient times. Techniques of modern composting probably started with the work of Sir Albert Howard in the 1920s. Since, than much literature has accumulated which has been reviewed by Goluke (1972); Finstein and Morris (1975). Compost is produced through a process that combine these materials in a large mass to maintain a temperature obtained by the action of fungi, bacteria and actinobacteria.

Composting is a controlled bio-oxidative process that involves a heterogeneous organic substrates in the solid state evolved by passing through a thermophillic phase and temporary of phytotoxins, leads to the production of CO$_2$, water, minerals and stabilized organic matter. Composting process is completed mainly by two processes degradation (physically and biochemically) and synthesis (stabilized humic substances) (Kadalli et al., 2004).

Infact, composting is the conversion by microorganisms of complex mixtures of quickly degradable organic materials to stable, humified materials, usually in a warm, moisture and relatively aerobic environment (Vicky et al., 1985). It is governed by composition of organic substrates undergoing decomposition besides the methodology adopted (Gaur, 1999). Now-a-days, the use of industrial organic wastes (liquid and solid) is recognised as stimulant in composting (Howard, 1935; Hajra and Kole, 1998) and also maintaining soil health and environment related atmosphere (Air
pollution-green effect), hydrosphere (surface or ground water pollution) and lithosphere (productive soil profile). There is certainly a thrust on land use planning several threats are giving alarming situation (Ramtake et al., 2004). Microbes feed on the organic matter provided in compost naturally produce phosphorus, nitrogen and potassium which keeps the soil in a healthy, balanced condition and inhibits growth of weeds, enhances soil quality/fertility and encourages healthy root development (Masood, 2006).

In 2005-06, there were 581 installed sugar mills in the country with a production of capacity of 190 lakh MTs of sugar of which only 455 are working. These mills are located in 18 states of country. Around 312 of the total installed mills are in the cooperative sector. 205 in the private sector and 64 in the public sector (Source : Directorate of Sugar).

Sugar mills are the second major agro-based industries next only to cotton, textiles. These industries produced large quantities of liquid and solid waste materials of byproducts. Press mud cake (PMC) a solid biowaste obtained from sugarcane juice as a byproduct in sugar industry before crystallization of sugar. That’s why farm yard manure (FYM), a traditional source of organic matter added to the soil may be replaced by organic waste PMC of sugar mills.

Nearly, 10 million tonnes of solid waste (press mud) is being produced by the sugar industry alone (Shalini et al., 2007), which is a soft, spongy, amorphous and dark brownish white, light weight material containing fibre, sugar, coagulated colloids including cane
wax, albuminoids, inorganic salts, soil particles and generally containing about 55-65 % moisture. The composition varies depending upon the quality of cane crushed and the process followed for the clarification of cane juice in a sugar factory (Kumar and Mishra, 1991 and Yadav, 2001). PMC is well recognised organic manure and it contains the macro and micro nutrients throughout in small amounts essentially required for the growth of plants (Soundarajan et al., 2007). It is also rich source of phosphorus (inorganic form), N, K, Ca, Fe and Mn, etc. (Table-1). PMC contains all the macro and micro nutrients though in small amounts, essentially required for the growth of plants. All these nutrients became available to the growing plants upon their release from the degradation of PMC added to the soil.

Microflora which degrade PMC is dominated by fungi imperfecti, Aspergillus and Penicillium etc. (Salunkhe, 1983). Sapkal (1974) noted a fair improvement in electrical conductivity (EC), maximum water holding capacity, bulk density, porosity and status of organic carbon. It is one of the best sources of organic matter to replenish the soil. PMC is rich in contains of organic carbon as well as P$_2$O$_5$ and when it is applied to soil as an organic manure, it is bound to increase the status of organic carbon or source of organic phosphorus. It is being used as a source of organic matter because of its high organic carbon contents, soil conditioner or as an soil ameliorating agent as a FYM and organic manure and improved soil fertility and crop productivity (Bawaskar, 1968 and Zende et al.,
1968). Its best use in preparing compost alongwith other byproducts and its use under water stress or drought conditions. Improvement in soil pH was also noted to be equally good (Allexander, 1972). The utility of PMC to improve crop yields under water stress conditions has been reviewed (Zende, 1992). PMC contains NPK and improves physico-chemical properties of soil.

In addition, the industries also generates about 45-50 million tonnes of baggase as a valuable byproduct. Solid waste baggase ash or flyash co-product in a sugar factory produced to 0.3 % on cane weight basis. It is creating nuisance to human beings through air pollution but has a potential in agriculture and related application (Kumar, 1999). Its spreading in the field as a fertilizers has been the useful practice and main ingredients present are silica, ionoxide, potash and lime. It is good absorbent of water on weight basis. It is used in agriculture either as mulch or as a soil conditioner. Flyash and distillery effluent causing air, water, soil and ground water pollution (Ali Khan and Dhaka, 1989).

There are more than 300 distilleries in India (AIDA, 2005). These are mainly situated in the state of Maharasthara, Uttar Pradesh and Karnataka. Molasses (8-10 million tonnes), being a byproduct of sugar industry bear immense significance is raw material for rapidly advancing alcohol and chemical industry (Shalini et al., 2007).

According to the recent estimates, the alcohol production in India has crossed over 3 billion liters/annum mark (Manickam, 2007). The proportion of waste water of distilleries generally known
as ‘Spent Wash’ or ‘Slops’, is nearly 10-12 time more than @ 10-15 liter per liter of alcohol (Baskar, 2004). The total alcohol production, spent wash is generated in massive quantity approximately 40 billion liters of spent wash annually.

Disposal of spent wash is creating environmental problem of water, air and soil pollution. Thus, it is hazardous causing ‘Chemical Time Bomb’ but also contains many plant nutrients (Ali Khan, 1998). Discharge of distillery waste into water subsidiary results in high concentration of organic matter and salts in the river. It produces obnoxious odour after fermentation and pollutes the water in the near by wells (Singh et al., 2007). The unpleasant odour due to the presence of skatole, indole and other sulphur compounds, which are not effectively decomposed by yeast or methanogenic bacteria during distillation (Mahimaraja and Nanthi, 2004).

The distillery spent wash (DSW) is characterized by its dark brown colour, high temperature, low pH, high ash content, high percentage of dissolved organic and inorganic matter which 50 % may be present as reducing sugar and large amount of potassium, nitrogen, phosphorus, calcium, chloride and sulphates. However, N.P.K., Ca, Mg and Cl are also present in appriciable amounts (Rajukannu et al., 1997). Thus, it can effectively used as a source of plant nutrients and as soil amended agent (Jadhav et al., 2005). Recently, the presence appreciable amount of plant growth promoters viz. Gibberlic acid (GA) and Indole acetic acid (IAA) have also been detected which further enhances the nutrients value of
spent wash (Murugaragvan, 2002) (Table-2). Due to the high manurial value, it is being used both as a soil conditioner or as a reclaiming agent or as a liquid fertilizer and possible to convert distillery effluent to a bio-assimilable form which has a great promise for effluent disposal for soil health management in agriculture. However, it cannot be regard nearly as K fertilizer and its nitrogen is present mostly in the alcohol organic state behaving as a slow release fertilizer, better than most inorganic N sources. DSW can be advantageously used for compost in the press mud to produce enriched quality of compost (Rajanan et al., 1996a). DSW may be useful organic material as a liquid fertilizer, soil conditioner and as a reclaiming agent. Its beneficial effect on soil fertility and crop production is well documented (Joshi et al., 1996 and Rajukannu and Manickam, 1997). Patil and Shinde (1995) indicates that application of spent slurry press mud compost enhanced uptake of macro and micro nutrients.

The Simbhaoli Distillery Unit generates 3000 liters spent wash every day. Indiscriminate disposal of spent wash has became an acute problem due to the waste water (Baskar et al., 2004). The premise, it produce obnoxious odour after fermentation and pollutes the water in the rivers, lakes and water reservoirs. The problem with distillery spent wash is its high BOD, COD and TDS. Its extremely large volume, foul odour, dark coffee colour, not highly biodegradable character, dissolved solid content that present significant disposal of increase pollution problem. Lowering of pH
value of stream increase inorganic load as caused ecological imbalance in climate, terrestrial, aquatic habitat and deplete the $O_2$ content in water (Chauhan, 1991) but can be used as nutrients for composting press mud (Ali Khan and Kashyap, 2006).

Water hyacinth (*Eichhornia crassipes*) an aquatic plant with a rosette of leaves, is presently regarded as a problem because of its ability to reproduce and spread rapidly in lakes, canals and rivers. The pollutional effect caused by this plant includes (a) navigation blockage (b) choking off drainage channels of cultivated land (c) dissolved oxygen (DO) depletion in the water body due to plant decay, which possibly could effect the fish life and (d) investigation of the paddy fields rendering land in some areas unproductive (Polprasert et al., 1980). It is a good absorber and accumulator of mercury from industrial effluents and absorb the nutrients from waste waters as well as during the level of organic matter and other polluted. Its uses in agriculture through decomposition can decrease some aquatic weed problem (Trivedey et al., 1985).

*Trichoderma viride* (cellulolytic fungi) is green coloured antagonistic free living entity, multiplies and spreads very fast in the soils and fight against other pathogenic fungi and more efficient for quick biodegradation of PMC. *Trichoderma* grows quickly in the soil organic matter and competes with pathogenic fungi, cause hyperparasitism (physical destruction of pathogen) and induce antibiosis or inhibition (production of toxins or poisonous substances) which ultimately destroy the pathogen and protect the plants from
diseases (Joseph, 2004; Vijayanan et al., 2004). The mass multiplied *Trichoderma* bioagent can be mixed with dried farmyard manure (FYM) or vermicompost in the ratio 1:5 at 25 % moisture level and is used as inoculation in the field. It has the capacity to convert wastes into the useful non-toxic products and survive in soil for longer times and the survival ability can be increased by creating suitable soil environment (Kolase et al., 2001).

It can be used of various agricultural wastes and byproduct for multiplication of decomposer as well as prophylactic agent against several disease and effective in decomposing the PMC and good quality of compost (Bhai et al., 1994; Anandraj and Sharma, 1997; Kosalya and Jayarajan, 1990; Sawant and Sawant, 1990; Srinivasulu et al., 2004). Shinde et al. (1990) studied the efficacy of different fungal cultures (*Trichoderma* etc.) in the decomposition of trash. Application of *Aspergillus* or *Trichoderma* or mixture enhances decomposition of cane trash producing compost of high quality. Similar attempt was made by Jadhav and Baber (1990) to prepare compost from PMC, spent wash and bagasse by adding bacteria as a source of culture. The organic residues added to the soil must be decomposed for nutrient recycling and availability of nutrients for crop plants were recorded (Pathakar et al., 2006; Ali Khan and Kashyap, 2007). The cellulytic fungi *Trichoderma viride* was observed to have the maximum decomposing ability in comparison to *Aspergillus niger* which caused complete decomposition (Chauhan, 2007).
Composting techniques introduced in collaboration with M/s Fabcon Inc. of the USA uses a machine the **aerotiller** and **microbial** starter to accelerate biochemical reactions that convert organics of spent wash to compost (Hemant *et al.*, 1995). The microbial culture used for bioearth composting consists to speedily selected and grown degradative bacteria and enzymes, that metabolize the organic component of spent wash or press mud cake. Pavgi *et al.* (1986) also reported that it is possible to convert distillery effluent to a bioassimilable from which has a great promise for effluent disposal in agriculture. Recently M/s Vulean Laval of India have developed a technology to obtain an organic manure rich not only in humus but also in nitrogen as well as potash. These system completely eliminates pollution problem arising out of distillery waste water.

Recent development have shown that press mud cake (PMC) mixed with distillery spent wash (DSW) and other biodegradables which are also rich in carbon, potassium and other macro and micro nutrients can be biodegraded in short period than FYM compost (3-4 months). Theopate *et al.* (1991) prepared compost by adding spent wash and PMC (1:1 and 2:1) in different proportion with and without culture gave the compost of expedites development differentiation process leading to accelerated aging to plants. **“Ch. Charan Singh Compost”** has been prepared which yields and organic humus and it will be ecologically sound, environmental friendly and economically viable for sustainable development (Ali Khan, 1998).
The bactin treated compost by mixing baggase and PMC in 1:1 proportion and adding 200 litters spent wash/heap (6 times) gave the highest quality of compost after 12 weeks. Ammonifying microorganisms have been found to hasten the rate of organic matter decomposition present in the distillery slop (Jadhav et al., 1992). Possibility of composting higher proportions of spent wash with press mud cake was reported by Patil and Shinde (1995) and the addition of rock phosphate during composting could enrich the compost with phosphorus (Savithri and Perumal, 1993). Byproduct of the sugar and distillery the process is a degraded material that is rich in nutrients (Nitrogen, Phosphorus and Potassium) and organic matter. Mineralization of organic matter of spent wash and development of ammonifying bacteria (Singh et al., 1991) and decomposition rate of organic matter supplemented with spent wash was very fast initially. In the process yields good quality of organic manure rich in minerals like N$_2$, P$_2$O$_5$, K$_2$O and trace elements. Application of spent wash compost to a soil is responsible for bringing about reduction in soil pH, increase the status of total nitrogen, available P, total K and improvement in physicochemical parameters of the soil.

The organic matter in the soils and the use of organic manures are traditionally associated with soil fertility. Continuous organic manuring results in getting a soil with lower bulk density and more pore space than the soils having repeated dressings. Degradation of the added organic matter in the soil is mainly biochemical in nature.
and ultimately leads to the formation of relatively very slow degradable compound humus which is highly colloidal substance. The humus formed is mainly responsible for imparting good properties (physical, chemical and biological) of soils (Zende, 1991). Decomposing organic matters affect the nutrient balance of soil. The rapid evolution of CO$_2$ by proliferating organisms improves soil phosphate availability and the sequestering and chelating compounds produced during the decomposition affect the availability of many nutrient cations. The improved aggregation enhances the soil aeration, water movement and better root development. Therefore, results in better plant growth and higher crop productivity. The compost can replenish nutrients and organic substrate, stimulate the soil microbes, helps to build soil structure. Many of us are more sensitive to chemical use and it is a safe and environmental friendly alternative to synthetic fertilizers to grow crops.

Coriander (Dhania) a name derived from the Greek Coris, a bug from its odour- *Coriandrum sativum* (L.) belonging to the family *Apiaceae* is an annual herb and seeds spice crop of 120 days. Mainly cultivated in the state of Rajasthan and Gujarat with a sizable average in M.P., U.P., A.P., Haryana, Punjab and Bihar. The habit of plant is annual with branched or tap root, stem is erect, herbaceous, hollow, more or less erect and sympodial, monocasial, branched, colour of the more or less ribbed stem is green and some time red to violet during the flowering period. Leaves are green or light green, shiny, waxy, alternate and first one are often gathered in a rosette.
The inflorescence is a compound umbel. The umbel has to eight primary rays peripheral umbelet and every umbellet the peripheral flowers. The fruit are globular or ovate with a diameter of upto 6 mm. Seeds are extensively used as food preparation including bakery products and medicinal use to be carminative, diuretic, tonic, stomatic, anti-bilious, etc. An infusion of the seeds are useful in indigestion, vomiting and intestinal disorders. Oil of seeds is a valuable ingredient in perfumes, beverages, pickles and sweets. In all the organs of Coriander plant are fairly good source of Vitamin A and Vitamin C and rich in aliphatic aldehydes.

Phaseolus aureus Roxb (Moong bean) is now known as Vigna radiata (L.) Wilczek belonging to the family Fabaceae. It is one of the most popular pulse crop of 90 days. A native of India is an annual herb with tap root, branched, stem, leaves, flower and pod fruit. The habit of plant is annual with branched or taproot, stem is herbaceous, climbing smooth. The leaves are alternate compound trifoliate stipulate with entire leaflets. The inflorescence is racemose and flower arranged in clustered auxiliary racemose. The seeds are exalbiminious with thick cotyledons green and fruit is pod linear or along usually 1½ to 2½ inches along. Pulse supply not only proteins but have also beneficial effect on the land productivity and soil fertility due to their capacity of fixing atmospheric N₂. Fruit is used in preparing many delicious food items such as papad, baris and kachories, etc. and rich in phosphoric acid.

However, no comparative assessment is available in literature to hasten decomposition process planned to findout best method of
hasten decomposition process of compost. Ecotechnology of compost (PMC+FA+DSW+Eiccho+ Tricho) effect in increasing the soil fertility and productivity of crop (Dhania and Moong bean) with the following objectives :-

1. To prepare compost from press mud cake (PMC), flyash, spent wash and *Eichhornia crassipes* by *Trichoderma viride*.

2. To observe quick decomposition of biodegradable press mud cake, flyash and distillery effluent into compost.

3. To evaluate the biodynamic effects of compost on growth and yield of *Coriandrum sativum* (L.) and *Vigna radiata* (L.) Wilczek [*Phaseolus aureus* (Roxb)].

4. To study the sustainable impacts of compost on soil environment.

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