

GERMINATION OF SEEDS AND ENHANCEMENT OF PLANT GROWTH THROUGH BIODEGRADABLE WASTE

(project – report)

Submitted in partial fulfilment of the requirements for the award of

Bachelor of Technology degree in Science

By

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BONAFIDE CERTIFICATE

This is to certify that this project Report is the bonafide work PRAVEENA.K (38770013) Who carried out the project entitled "**GERMINATION OF SEEDS AN ENHANCEMENT OF PLANT GROWTH THROUGH BIODEGRADABLE WASTE**" under our supervision from October 2020 to April 2021.

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DECLARATION

I PRAVEENA.K (38770013) hereby declare that the project report entitled **“GERMINATION OF SEEDS AND ENHANCEMENT OF PLANT GROWTH THROUGH BIODEGRADABLE WASTE** done by me under the guidance of **Dr. L. Inbathamizh** at **Sathyabama Institute of Science and Technology, Chennai** is submitted in partial fulfilment of the requirements for award of Bachelor of Technology degree in science.

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ABSTRACT

A biodegradable waste can be defined as a material which can be decomposed easily by bacteria or any other natural organisms and not being the part of pollution and this biodegradable waste are the materials which are can be easily degraded by natural factors like Microbes example bacteria, fungi and few other abiotic components like temperature UV oxygen etc.,. The examples of such biodegradable waste, our kitchen waste, food materials and other natural waste. Here, we have taken 7 different types of biodegradable waste like vegetable peels, eggshells, Neem cakes, Cow dung, Coco peat, bone meal and used coffee grounds along with 7 different varieties of seeds cowpea seeds, groundnut seeds, green gram seeds, corn seeds, Black eyed pea seeds, mustard seeds and coriander seeds. Here we have used this biodegradable waste as organic fertilizers to obtain nutrient enrichment and to enhance the growth of plants. We have measured seedling height of the plant on the basis of daily analysis and observed morphological changes of the seed from a sprout to the plant.

Keywords: Biodegradable waste, Organic fertilizer, Nutrient enrichment, Enhancement of plant growth

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List of abbreviations & symbol

CCS carbon content of sample
DW dry weight of the sample
MC moisture content
NPK nitrogen phosphorus and potassium
PH potential of hydrogen
PPM parts per million
gms grams
Mg milligrams
% percentage
O₂ oxygen
H₂O water
Cm centimetre

CHAPTER 1: INTRODUCTION

1.1 what is Biodegradable waste

Biodegradable waste it is a material or substance which can be defined as a material which can be decomposed easily by bacteria or any other natural organisms and not being the part of pollution. This biodegradable waste are mainly obtained from plant and animal sources. The biodegradable waste can be e uses for various sources for nutrient enrichment of plants by the process called composting. Composting the recycling of biodegradable waste such as vegetation and food waste reduces the amount of waste going to landfill and is therefore a rapidly growing sector the residual compound has been described as this table sanitize and humus light material kitchen organic matter for free from offensive order resulting from the composting process of separating collected bio-waste recycling is widely assumed to be environmentally beneficial because household biodegradable waste to landfill has a negative impact on both environmental and economically the elements of household waste most commonly collected by recycling for garden waste of for composting household waste most commonly collected for recycling our garden waste for composting .India is developing country with 16% of world population and 2% of total land area the exponential increase in ink industrialisation is not only consuming larger areas of agriculture land but simultaneously causing serious environmental degradation industrialisation and urbanisation have resulted on discharge of large waste is rich in organic matter as well as in nutrients there are enormous quantities of industrial solid organic waste or biodegradable waste available outside in the form of different sources and they are to be used judiciously in for plant growth if this waste or properly e dispose it so that it does not contribute any problem to the pollution. Waste is defined as discarded material which has no value in normal use or for ordinary use waste are those undesirable useless and unwanted materials and substance that come from human and animal activities

Waste or those undecidable useless and unwanted materials and substances that comes from various sources generation of waste is inevitable the management of waste assumes importance in the view of environment by they pose according to UNICEF, 10 biodegradable waste can be used for various purposes which contain components which can be used as bio fertilizers for plant..Biodegradable material contains food waste like vegetables and fruit peels ,dead plants and animal sources eggshells, chicken ,garden waste paper materials exactra. These biodegradable waste is typically originating from plant and animal sources which can be degraded by other living organisms . this biodegradable waste can often be used for composting which turns the waste into humus it can also be used as a source for heat electricity and fuel in future by using an aerobic digestion as it producers additional biogas and still dairy was usual nutrients that can be implemented to the soil specially animal basis kitchens cast such as leftover bone meal fish meat our best decomposed this way as these are best not a composite finally the leftover human food vegetables no animal flesh can also be used as fodder to plants.

1.2 Source of biodegradable waste :

- Residences and gardens [garden trimmings, leaves, grass cuttings]
- Restaurants and canteens [Raw peelings and stems rotten fruits]
- Market [organic waste of vegetable and fruit markets]
- Parks and road verges'[grass clippings ,branches leaves]
- Municipal areas [residential solid waste human and animal extra]
- Dumping sites [decomposed garbage]
- Animal waste[cattle ,poultry ,pig dung from urban and Peri urban forms]
- Slaughterhouses [contents of digestive system]

Examples of biodegradable waste are : human and animal waste. Plant products wood paper ,food waste, leaves, grass clippings ,natural products scraps of leaves and vegetables. Reminds from the death of living creatures. Manual sewage sludge and slaughterhouse waste.

1.3 chemical nature of biodegradable waste and its transformation

Biodegradable matter is a complex mixture of many chemical substances. These materials serve as precursors for soil humus. The most commonly found and well understood organic compounds finding their way into the soil and are subjected to normal decomposition process are carbohydrates starch sucrose cellulose hemicellulose pectin mucilages gums extra proteins amino acids are means fats oils raisins waxes extra alcohol all the aldehydes, ketones extra organic acids, lignin, compounds having ring structures like phenols, hydrocarbons, alkaloids and compounds with organic bases alcohol all the aldehydes, ketones extra. Carbon present in the soil in the form of organic matter. Organic matter are mostly used to improve soil conditions and fertility include farm yield manure green manure crop residue such are composed biogas spent slurry microbial preparation vermicompost biodynamic preparations sewage sludge and other industrial waste also find application in agriculture.

For all organic matter atmospheric carbon dioxide serves as main source of carbon carbon dioxide is converted into organic carbon largely by the action of photo autotrophic organisms the higher green plants on the land and algae in aquatic habitats carbon is being continuously fix it into organic form through the process of photosynthesis and once bound to the carbon becomes available in the use of next generation of new plant carbon fixation involves reduction of carbon dioxide by hydrogen donor and synthesis of carbonate from reducing carbon through cyclic mechanism Calvin cycle generally the carbon and nitrogen ratio in fresh organic matter of 30% greater than nitrogen carbon ratio present in the soil under both natural agriculture condition and equilibrium is established from fresh additions of organic matter.

CHAPTER 2 REVIEW OF LITERATURE

Modern agriculture farming practices in India along with irrigational use of chemical inputs over the past four decades have resulted in not only loss of natural habitat balance and soil help but have also cause it many hazards like soil erosion decreasing groundwater level soil salinization pollution genetic erosion and reduces food quality.all these have increasing the cost of cultivation and resulted into loss in yield and productivity year by year thereby increasing the financial pressure on the average farmer(Ram ,2003) .farmers do not find agriculture a variable proportion anymore in fact a large number of farmers have committed suicide specially in marathwada regions of Maharashtra(Deshpande,2002).In this background organic agriculture is attracting farmers world over due to its various advantages over modern agriculture practices finally it is a farming system which supports and strengthens biological process without recourse to inorganic remedies such as chemicals or genetically modified organisms not only this organic agriculture is productive and sustainable(Reganold et.al., 1993 .Letourneau and Goldstein, 2001 and Mader et.al.,2002) many states important agencies non governmental organisation and individuals in India have started practicing organic farming. It emphasizes the use of Management practices in preference to the use of form inputs taking into account the regional condition required locally adapted systems.among the various crops under organic farming vegetables have very high importance as they hold and prominent position in the vegetarian diet of Indians India is second largest producer of vegetables and fruits after China and hence there is and vast scope for export of different vegetables as vegetables are the main source of safe and nutritious food as well as important in export they have become the main attraction of organic farming sweetcorn classified under vegetable category is been highly preferred as scrumptious delicay among just the Indian population. The ever increasing demand of this highly profitable crop has lowered the farmers for its cultivation round the year. Cultivation of sweet corn through organic method is

environmental friendly providing residue free produce to the health consciousness.

2.1 Importance of organic fertilizers and manures

Continuous use of the soil and mono culturing has lead to loss of its important nutrients particularly nitrogen phosphorus and potassium and test the soil loses its fertility. For the healthy and normal growth of crops different kind of fertilizers need to be used which are classified under two groups 1. Organic manure 2. Chemical fertilizer organic manuals or of biological origin the organic matter content is bulky and large and the nutrients special e nitrogen potassium phosphorus contents are less in comparison to chemical fertilizers. Organic manure is very widely in the amount of nutrients they contain therefore besides providing the essential macro and micronutrients they also provide an array of plant growth promoting substances. Manures contributes to soil fertility in addition to nutrients manure provides carbon and other constituents that affect soil humus content and biological activity e and soil physical structure(Wagner and George,2001).organic manure is can be of animal or plant origin dried or less processor waste materials from animal remains from livestock and dairy can be classified under animal manure. Fish emulsion blood and Bone meal falls under this category as well as. Plant manuals are essentially the products derived from plants. These manuals are considered to be higher in plant growth promoters. They also participate in the vital process of mulching. The commonly used plant based manuals or corn gluten meal green menus and cotton acid manures like vermicompost and formal manuals are derived by composting. Residue source of both plant and animal origin and other type of organic input can be classified as under microbial inoculants which are bind to metal stick microorganism selected for their synergistic ability to stimulate plant growth and convert atmospheric nitrogen into a form beneficial to plants they are commonly known as biofertilizers.

Cow dung manures : cow dung manure is a composite form of cattle dung with agriculture residue. It improves the soil nutrients variation and water holding capacity will stop it releases nutrients slowly and steadily and activates soil microbial biomass (Ayuso et al.,1996 ,Belay et al.,2001) . In India cow dung manure is most commonly used organic manure which contains 0.5 -0.7%N ,0.3-0.9%p2o5and 0.4-1.0%k, depending upon the type of plant and nature of feed (Chhonkar ,1995).

Neem cakes : Neem cake is by product obtained in the process of cold pressing of neem tree fruits and kernels and the solvent extraction process for Neem oil. Neem has demonstrated considerable potential as an organic fertilizer. The quality of the neem cake is determined by the amount of oil left in it and also the process by which extraction is done. It contains 5-5.2% N, 0.6-1.4% P, and 1.2-16% K. The physical form of neem cake is in powder or flake form. It is a potential source of organic manure under The Bureau of Indian Standards. Specialization number 8558. Full stop. Neem cake is also used mainly for controlling nematodes in different crops. Neem products were found effective against more than 350 species of arthropods, 12 species of nematodes, 15 species of fungi, three viruses, and species of snails and one crustacean species (1991 and Mehta, 1997).

Green manures : Green manure supplies organic matter as well as additional nitrogen if it is the legume crop which has the ability to acquire nitrogen from the air with the help of its root nodule bacteria. It is also protective against soil erosion and leaching. They contain considerable amount of nitrogen, potassium, phosphorus, and other mineral nutrients. Besides organic matter, there is an increase in yield after green manure is usually of the order of 30 to 50%.

Seed weed manure : Seaweeds are used for centuries as a rich source of organic plant nutrition. It contains numerous minerals and every essential trace element, simple and complex carbohydrates, and a number of plant growth hormones. Seaweed extracts can cause increase in root development, photosynthesis, resistance to environmental stress, and contain natural organic chelating agents that react with some of the locked trace elements in the soil making them soluble and available for the uptake of by plant.

Vermicompost : Vermicompost is a non-thermophilic biodegradation product of organic material through interaction between earthworms and microorganisms. The commonly used earthworms include *Lumbricus rubellus*, *Eisenia fetida*, and *Eugenia*. This earthworm improves the soil physical, chemical, and biological conditions for plant growth and nutrient uptake. The accelerated decomposition of plant litter and organic matter by these organisms improves soil fertility by releasing mineral elements in the form that are available for the uptake of plants. Vermicompost or materials

characterized by high porosity variation drainage water holding capacity and microbial activity. (Edwards and Burrows, 1988,Atiyeh et al.,1999,200)

Fish meal : fish meal is highly heterogeneous material both physically and chemically. It contains particles arrival from different fish tissues pieces of bones scales and blood water. Fishman has been used as livestock feed for many years which is popular because of its high nutritional value as it has high levels of essential amino acid such as lysine methionine cysteine content. It also has high digestibility and biological value. It also contains vitamin such as B12 colon near scene pantothenic acid and riboflavin and is a good source of calcium copper iron phosphorus and other trace elements. Fish meal is low in fibre and easy to produce the nitrogen potassium phosphorus ratio in fish meal is generally about 6:5:15.

Bone meal : it is prepared by grinding animal bones and one of the earliest source of phosphorus used in agriculture will stop the commercially available bone meal is team and to remove any row animal tissues. The primary phosphorus mineral in bone material is calcium deficiency hydro appetite which is more stable than Rock phosphate but much less soluble than conventional phosphorus fertilizers.(Nelson and Mikkelson,2008).bone meal contains 5% nitrogen 10% phosphorus and 5% potassium.

Poultry manure : the poultry manure is relative li chief source of both macronutrients and micronutrients and can increase soil carbon nitrogen soil porosity and enhance soil microbial activity. Poultry manure is most available of all men use produced by livestock. Moreover the nutrient contents of poultry manure or among the highest of all animal manure and the use of poultry manure as soil amendment for agricultural crops provides appreciable quantities of all the major plant nutrients. It also improve soil microbial activities soil tilth and soil chemical properties.(Michael and George ,1998).it was also indicated that poultry manure more readily supplies phosphorus to plants than other organic manure sources.

Sheep manures : it says rich soil amendment but low in nitrogen compared to other animal manure but still high in phosphorus and potassium and effective for plant growth being a natural slow releasing manure it is often used as mulch composting then manure before use is often highly beneficial .

Sewage / sludge manure : sewage sludge contain organic matter and is very rich in macro and micronutrients. So the agriculture and forestry disposal is widely recommended application of sewage sludge disposal affect soil fertility plant development and cause contamination by heavy metals and organic compound full stop it also modified the Dynamics of soil microbial organic matter decomposition nutrient cycling and physical structure of soil. (Bettiol and Carmargo,2001).

Biofertilizers : biofertilizers or essential components of organic farming containing live or Latin cells of efficient strains of nitrogen fixing phosphate solubilizing for cellulitis microorganisms. These are applied to seeds oil or composting areas with the objective of increasing number of such microorganisms and accelerate those microbial process which argument the availability of nutrients that can be easily assimilated by plants. Biofertilizers play a very significant role in improving soil fertility by fixing atmospheric nitrogen both symbiotically and non symbiotically they also solubilize in soluble soil phosphates and produce plant growth substances in the soil. The role and importance of biofertilizers is sustainable crop production has been reviewed by several authors (Biswas et al., 1985, wani and Lee ,1995, katyal et al.,1994). the organic compounds released by roots and bacteria play an important role in the uptake of mineral nutrient. Commonly explorer biofertilizers in India are as follows.

Rhizobium species: This bacteria fix atmospheric nitrogen in symbiotically by performing nodules in roots and stem. They are highly specific and only certain legumes are benefited by the symbiosis.

Azotobacter species : these are beneficial to a wide array of crops covering serials millets vegetables cotton and sugarcane. They are free living non symbiotic nitrogen fixing bacteria that also produces certain metabolites helpful for the growth of plant and antibiotics that suppress many root pathogen.

Azospirillum species : these are also nitrogen fixing microorganism beneficial for non leguminous plants like ok a ZTE the benefits transcend nitrogen enrichment production of growth promoting substances Azospirillum species are the most studied plant growth promoting rhizobacteria species.

Blue green algae and Azola : they are photosynthetic nitrogen fixers and are free living. They to add growth promoting substances including vitamins improve the aeration and water holding capacity of the soil and at to biomass when decomposed after completing its life cycle. Azola is an aquatic friend found in small and shallow water bodies and in rice fields. In has symbiotic relation with blue green algae and can help rice or other crops grow dual cropping and green manuring of soil the blue-green algae in leaf pockets fix atmospheric nitrogen and provide it to the crop plants .

Phosphate solubilizing bacteria: phosphorus both native in soil and applied in inorganic fertilizer becomes most unavailable to crops because of its low levels of mobility and solubility and its tendency to become fix in soil the PSB on life forms that can help in improving phosphate uptake of plants in different ways. It also has the potential to make utilization of Indians abundant deposits of Rock phosphates possible much of which is not enriched.

2.2 what is organic crop protection ?

Pest and disease management is dependent on the plant and animal production systems manager with an emphasis on sustainable and renewable biological process. Preventive pest management relies heavily on promoting plant help vegetation management and biological control. Curative best treatments include application of microbials botanicals soaps oils and minerals and argumentative releases of predator synthetic pesticides are generally not applied and less exceptions are granted.

Organic crop strategies

Weed management : the main weed control strategies used in organic farming usually combined cultural or husbandary techniques with direct mechanical and thermal methods crop difference in their ability to compete with weeds. Some of this difference in competitive ability may be due to allelopathic properties of thus the inclusion allelopathic plants in crop rotations maybe have the potential to aid diseases.

Pest management : Pest problems can be particularly severe in large horticulture holdings where several factors of a single crop species may be grown. Pest control strategies in such cases need to be preventive rather than you rate you will stop the balance and management of crop in an unincorporated areas. Crop species and temporal and spatial patterns of the crops rotations aim to maintain a diverse population of beneficial organisms including competitors parasites and predators of pest. Damaging populations of pest and pathogens are less likely to establish in soils that sustain high levels of beneficial organisms. Use of botanical and biocontrol agents also proved to be useful in dealing with pest. Botanicals are pesticides derived from plants they degrade rapidly and therefore considered safer to the environment than the common synthetic chemicals commonly used botanicals are extracts of neem leaf or seed chilli garlic rotenone and pyrethrum (Guleria and Tikku ,2009).

Disease management : Direct disease control methods are really necessary in most organic crops although some natural and plant extract based fungicides are applied regularly to control foliar disease in some high value crops such as top fruit grapes and vegetable transplants. Irrigational practices and soil preparation strategies also influence crop diseases control.

2.3 Effects of organic manures on :

2.3.1 crop growth : Neem cake application improve soil fertility strengthening of roots the growth and leaf age with an increase in the quantities of neem cake tomato plant showed an increase in the number of branches number of leaves and number of flowers(parray et.al., 2002). Plants of *coleus forskohili* treated with arbuscular mycorrhizal fungus , neem cakes and *pseudomonas fluorescense* showed significantly increased plant height,spread , no of branches and dry roots and reduced diseases incidence compared to control (singh et.al., 2012) .Terry et.al.,1996 revealed that application of both *Azospirillum brasiliense* and *Azobacter chroococcum* along with 30 kgs nitrogen increasing the plant height root length and fresh and dry weight of aerial parts in tomato plant height increasing the level of calcium superphosphate along with biofertilizers and also observed increase in shoot length number of leaves number of branches should dry weight when maize plants were inoculated with spirillum species compared to control and reported highest number of branches number of leaves fresh weight and dry weight of fruits per plant in phyllanthus by application of azospirillum phosphobacteria and poultry manure. Leaf area index leaf stem ratio and absolute growth rate of cherry tomatoes was found to be enhanced when treated with biofertilizers and reported that inoculation of azospirillum species showed an increase in many plant growth parameters .

Investigation by Edwards on wide range of vegetable and ornamental seedlings, indicated earlier and better germination with vermicompost compared with control police top (gajalaxmi ,2002) show that *crossandra undulaefolia* plants more in soil amendment with favourable root to shoot ratio and greater biomass per unit time than the control plants. Similar findings was reported by(classen,et.al.,2007 Vadiraj et.al.,1992 and patil 1995) also reported significant increase in plant growth attributes by application of vermicompost in cardamom and onions respectively.

According to the studies conducted by (El Tarabily et.al., 2003) at UAE on radish fish manure was found to support plant growth in a sandy soil very effectively in comparison to chemical fertilizers. The manure was reported to work as a source of nutrients and precursors for like auxins gibberellins cytokinins Rao and shaktawat 2001 reported increased number of branches leaves area index root dry weight hydration ratio and periodic dry matter accumulation with the application of poultry manure plant height number of leaves and stem growth was increased with sheep manure addition to amaranth's species.

Sekhon and Agarwal (1994) note to improve leaf growth in maize with application of cowpea green manure over control and FYM treatments. Ellen Rubia et.al., (2007) reported higher synchrony between the crop relative growth rate and nitrogen released from the green manure when incorporated at early crop growth stage the seaweed liquid fertilizer increases the number of flowers in black gram and enhanced the number of leaves and length of stem by combining application of seaweed manure goat manure and vermicompost. Awad et al., (1995) found dead sea with slides application significantly increasing the growth of apples seedlings.

2.3.2 yield and productivity : sundhariya et al., (2003) reported that in sweet Basil application of urea enhanced number of leaves and herbage yield over control and other treatments will stop the fruit length breadth weight per plant and fruit weight per hectare of cucumber where is significantly influenced by application of cow dung manure similarly Eifediyi and Remison (2010) recorded the highest weight of plant and yield per hectare in cucumber with application of 10 hectare form in manual and 400 kg per hectare of chemical fertilizers tuberous root yield compost of sweet potato was significantly enhanced in response to the application of farmyard manure indicating enrichment of soil with organic matter through the use of cow dung manure. Grewal and Tehran (1984) where in they reported in enhancement of potato tuber is due to addition of FYM Bazaar et al., solanki et al., 2003 Ram and

patha 2007 Raghav and Shashi Kamal 2007 also reported significant increase in the yield of different vegetable crops combined application of neem cake and FM increased the tomato(parray etal., The hormones produced by rhizosphere .

Amarchandra 1998 reported an increase in yield and quality of brinjal, tomato, okra French beans and cabbage. Raut et al.,(1995) , Jat and Ahlawat (2004) and patidar et al., (2002) had reported significant increase in yield and quality of different crops like soya bean maize wheat cotton chickpea exactra due to the application of different types of biofertilizers with reduced dose of inorganic fertilizers had induced very high yield in okra that inoculation of azospirillum plants cause it very high increase in yield over control similarly the tomato yield was very clear favoured by sewage sludge fertilization and no difference was observed from other organic fertilizer treatments. Applications of vermicompost give higher germination growth and yield of mungbean compared with control similarly application of vermicompost in combination with chemical fertilizers head and hands with the yield of potato tubers over control noted improvement in fruit number and fruit yield in *Abelmoschus esculents*.and experimented conducted by Paul ET Al 2010 in West Bengal India on rice revealed increase in dry matter accumulation and number of panicles per metre square when treated with fish meal in comparison to fvm treatments a similar treat was observed in the yield attributes like grains per particle percentage field grains thousand grains weight grain yield stress and harvest index The grain yield per hectare significantly improved in barley and oats when treated with bone meal and mineral fertilizers in comparison to chemically treated once a similar trend was demonstrated by grain quality parameters as well according to sing it all 2009 application of bone mill Neem cake and FYM in combination improved plant growth and rhizome killed in Ginger. Superior ratio of PM was also reported by Chandrasekhar et al., 2007 showed an increase in seed yield of maize with application of poultry manure. Grain yield in maize was found to be improved by the application of poultry manure in comparison to FYM the application of poultry manure at 10:00 hectare recorded higher green hill and was economically similar application of PM at 12 hectares per metre square showed increase in plant height number of rows per number of grains for thousand cranes wait grain yield biological IL and harvest index of maize.

Ayeni et.al., (2001) reported that application of poultry manure increases plant leaf area height number of leaves branches fruit and fruit yield in tomato when compared with control chemically treated with tomato plants mirabai et.al.,2007 reported that poultry manure was found best for increasing the number of harvest number of fruits and plants total fruit hill and net returns in bitter gourd use of decomposed poultry manure significantly improved number of fruits fruit and fruit weight and yield of muskmelons over controlled 2002 noted significant increase in only and killed with application of PM and sheep manures. Bulk application of green manure alone cause it's significant increase en route and sugar hill of sugar beet similarly combined application of green manure and poultry manure was reported to induce higher yeild.Green hills and economic profits in rice increased growth and yield in tomato due to application of seaweed manure similarly findings were recorded in wheat by seaweed extract increased fruit yield when sprayed on tomato plants during the vegetative stage producing large size it fruits with superior quantity the seaweed extract increased the yield of plants growing at all concentration of nutrients supplied by increasing been weight bean numbers and also increased the nitrogen concentration of beans. Nutrients contained in sludge increase plant biomass and yield. (Brofas et.al.,2000,cogger et.al., 2001 . noted that sledge and nitrogen fertilizer application as a source of applied nitrogen with comparable in regards to grain and field of corn.

2.3.3 physiology and biochemistry : Berova and karnatsidis (2009) reported increased photosynthetic pigments and leaf gas exchange in red chilli due to application of vermicompost application of Green Man use had in hands with the photosynthetic rate of transpiration rate and somatic conductance the leaf area index chlorophyll content and photosynthetic rate of leaves of pistachio seedlings were improved when treated with vermicompost over control in Ginger the leaf chlorophylls carbohydrates and proteins were increased and their vermicompost amendment.

Similarly apart from the increasing leaf area and photosynthetic pigments in red pepper the rate of net photosynthesis was higher in treatments with vermicompost as compared to control plant use of poultry manure and microbial inoculations had improved the photosynthetic rate in tomato in a similar study in integration of meat compost and poultry manure resulted in highest photosynthetic rate over control in sorghum the application of cow dung manure along with recommended doses of chemical fertilizers had caused significant increase in leaf chlorophyll contents and leaf area duration of wheat over control sheep manure treatment served as a rich source of phosphate and exerted a more pronounced influence of leaf nutrient composition and increased uptake of NPK CA and MG by the seedlings and also increased the concentration of CA k and p in the leaves. / Application improved net photosynthesis resulting in higher plants growth and photosynthetic products of *Medicago sativa* (Antlion et.al., 2010).

2.3.4 Nutritional quality : Total antioxidant activity of head cabbage was increased by application of FYM and mineral fertilizer (Bimova and pokulda ,2009) reported that application of FYM resulted in to higher protein contents in ground nuts. Similarly Ravindran and balanambisan (1987) reported that starch content of potato increased with increasing application rate of FYM .application of vermicompost to barley also resulted in higher protein content over control combined use of vermicompost and microbial inoculants improved microbial constituents total carotenoids antibiotics antioxidants and total phenolics in brassica Rapa combined application of poultry manure cow dung pig the sheep manure improved nutrition retention capacity of Apple orchard oils and applications of poultry manure significantly increased calcium magnesium and potassium contents and control over chemical treatments manure carbohydrate protein and lipid contents in mulberry leaves (kerenhap et.al.,2007) .

CHAPTER 3 : AIM AND SCOPE

AIM : To study germination of seeds and enhancement of plant growth through biodegradable waste

SCOPE : The use of biodegradable waste as an organic fertilizer to supply nutrients to the soil which is required for the stimulation of plant growth . This organic fertilizers supplies nutrients required for the plant growth and make soil fertile. Here we have used homemade fertilizers from biodegradable waste like used coffee grounds fruit peels vegetable peels, cow dung, cocopeat, Neem cakes, Bonemeal. This biodegradable waste serves as organic matter for plants because these degradable waste mainly contains high amount of carbon ,methane and other organic compounds which stimulates plant growth.

CHAPTER 4 : MATERIALS AND METHODOLOGY

4.1 MATERIALS

- Seeds
- Potting mix (loam soil, topsoil or clean builder's sand)
- Mulch
- Water
- Nutrients / fertilizers

Conditions necessary for seed germination: water ,oxygen, temperature, light

- Water : water is necessary for seeds to swell, burst, open then to transport food for growing embryo.
- Oxygen : oxygen helps to provide the energy needed for growth and development.
- Temperature: temperature needed where is for particular type of plant.
- Light : light is not required for most of the plants through it is needed so that plant makes its own food.

4.2 METHODOLOGY

- Simple steps to grow plants from seed using organic matter as follows.
- Collect or buy seeds
- Choose a container ,tray ,pot with drainage holes or drill holes if needed.
- Fill the container with seed compost (seed starting $\frac{1}{2}$ potting mix with $\frac{1}{4}$ selected dried organic matter).
- Sprinkle the seeds evenly over the compost.
- Moisten the surface of the compost.
- Place the container or pots in warm lighted area.
- Water them wisely and allow them to grow.

4.3 organic fertilizers / matter to use around our kitchen garden

4.3.1 used coffee grounds

coffee grounds at a bit of nitrogen and minerals to soil attract worms even deter slugs.

The acidity of coffee affecting the soil pH neutralizes as the coffee decomposes.

So need not to worry about its acidic nature.

But we should be careful while applying it layer on the top of the soil.

Thick layer of coffee on the top layer of the soil creates a crusty shell after drying which does not allow water to pass through.

So make a thin layer.

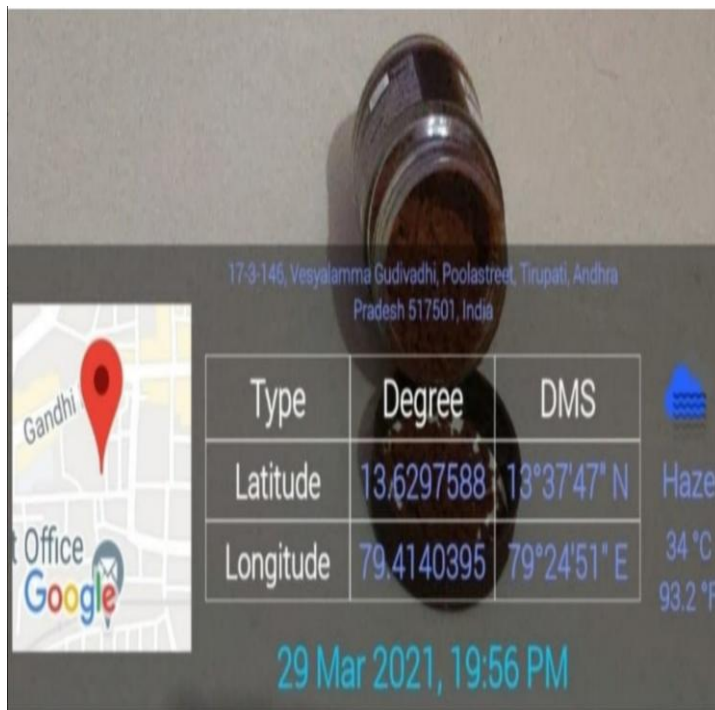


Fig 4.3.1 use of coffee grounds

4.3.2 use of eggshells :

Eggshells contains 93% of calcium carbonate and 1% nitrogen along with other nutrients that soil needs.

Crushed egg shells offer surprising benefits to wide array of plants.

Eggshells are a natural by-product and they are rich in nutrients that plant and soil needed.

Dry the eggshells in the sunlight crush them into a fine powder and spread them around the soil.

Many plants are susceptible to and disease known as blossom – end root.

The cause of this is calcium deficiency eggshells replace depleted calcium in soil to protect against deadly diseases.

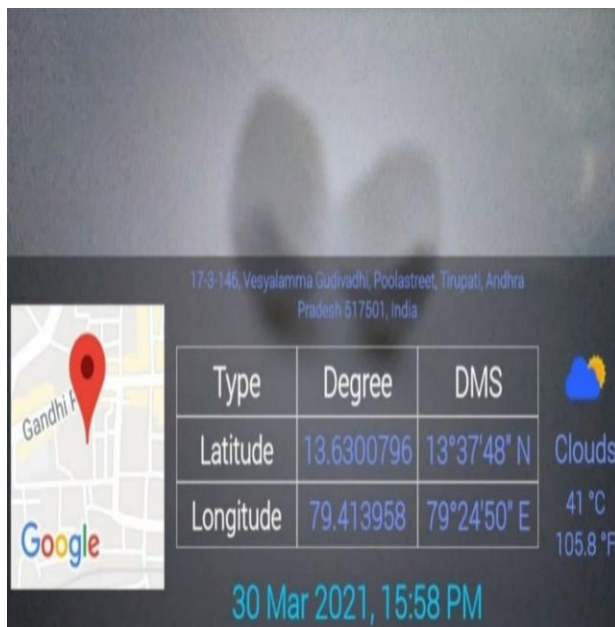


Fig 4.3.2 eggshells

4.3.3 use of Bone meal

Bone meal is a mixture of finely and coarsely grinded animal bones and slaughterhouse of waste products.

It is used as organic fertilizers for plants and nutrient supplements to animals.

Bone meal is used as essential nutrients for plants to help them flower and new plants to produce strong roots.

It can be used for planting holes for the plant and it is very useful when planting bulb in autumn.

Sprinkle the bone meal fertilizer evenly over the soil or add it to plant compost.

Make sure to mix it well whether it is dry water it well.

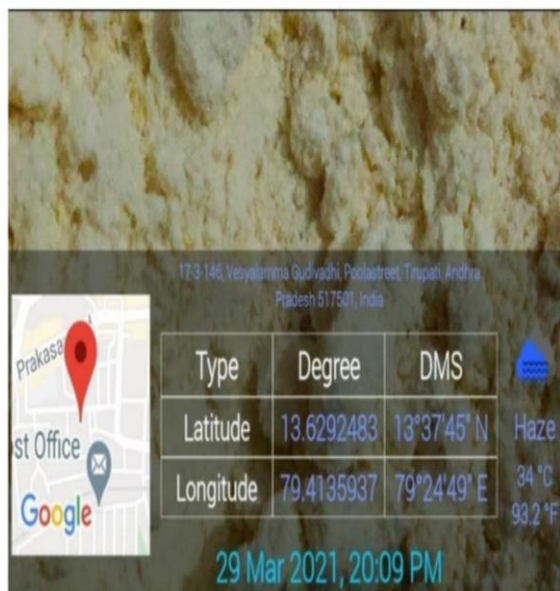


Fig 4.3.3 bone meal

4.3.4 use of neem cakes :

Neem cakes organic manure is obtained in the cold pressing of neem tree fruit

it is a potential source of organic matter and best source of nutrients which supports the growth of plant

In addition to nutrients the name cake protects the plants from insects and pest

Take hundred grams of neem cake sprinkle them on the top of soil and still it with a stick on the top of the soil for the uniform distribution.

the use of neem cakes increases the soil fertility and also enhance the growth of plants because it contains high levels of nitrogen, potassium ,phosphorus and isoprenoids.

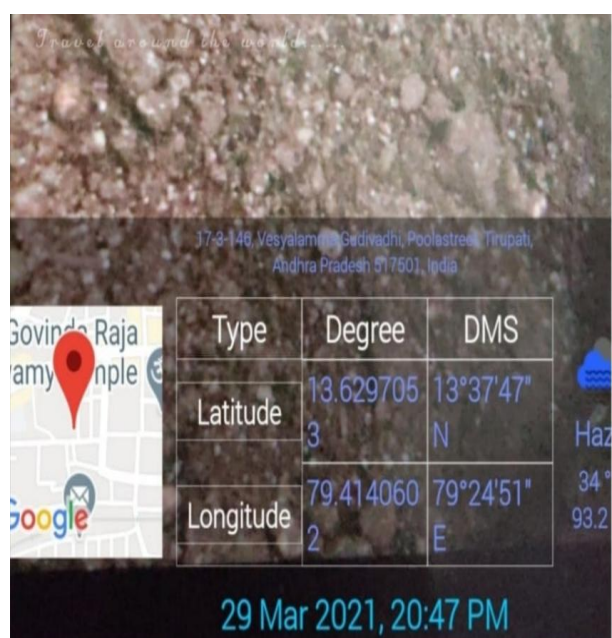


Fig 4.3.4 neem cakes

4.3.4 use of vegetable peels

Potato peels green leftovers broccoli stalks, citrus rinds can be easily composted.

Dig a ditch currently in and on used bed or soil of a pot and dump the garbage bin and cover it up.

Scraps will decompose and adds Nutrients to the soil .

When the foods like pasta, rice, potatoes ,in the boil water has lots of nutrients or releasing from this foods.

cool this water and pour it into the soil using as a natural fertilizers.

And also increasing the healthy bacteria to grow in the roots .because it contains starch where as the starch is beneficial for plants.

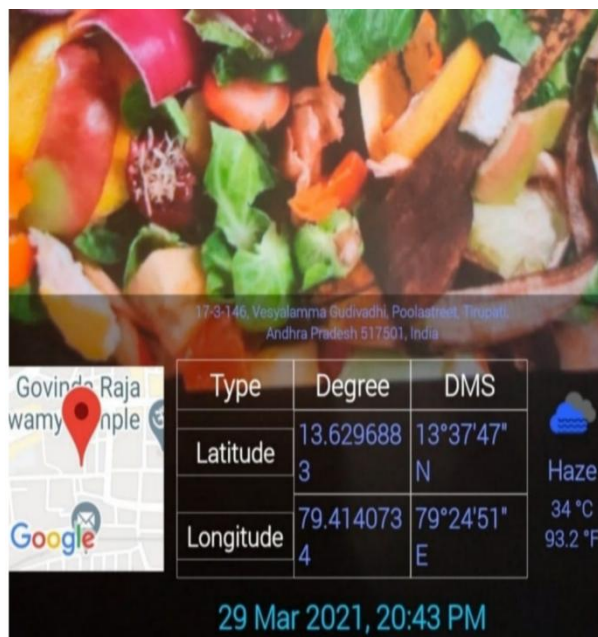


Fig 4.3.5 vegetable peels

4.3.6 Use of Cow dung :

Cow dung is the very effective natural fertilizer.

Decomposition of cow dung mainly consists of carbon, nitrogen, phosphorus Oxygen and salts exactra.

The addition of cow dung increases the mineral status of the soil enhance the resistance of plant against pest and other diseases.

Mainly stimulates plant growth and other beneficial activities such as sulphur oxidation and phosphorus solubilization.

Normally the composition of Cow dung is 80% of water supports a matrix of undigested plant material which is rich in nutrient microorganisms and their by products.

Take some amount of cow dung mix with your composed still well with stick to mix in the soil and enhance the soil fertility and plant growth.

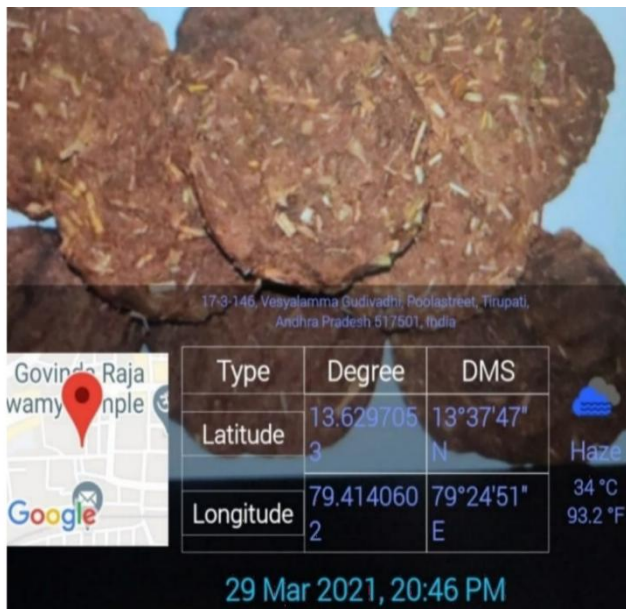


Fig 4.3.6 cowdung

4.3.7 Use of cocopeat :

Coco peat is made from the pith of coconut husk.

It is naturally antifungal and it is an excellent growing medium for home or learn garden plants.

It improves aeration in the soil for optimal root growth while maintaining the nutrient availability for plants.

Coco peat can be directly incorporated into the garden soil to improve water retention aeration and decreasing soil fungus and root diseases.

Mix it in 25 /75 ratio in the soil

It can also be used as mulch around the garden plants to help soil retain moisture and prevent weed growth.

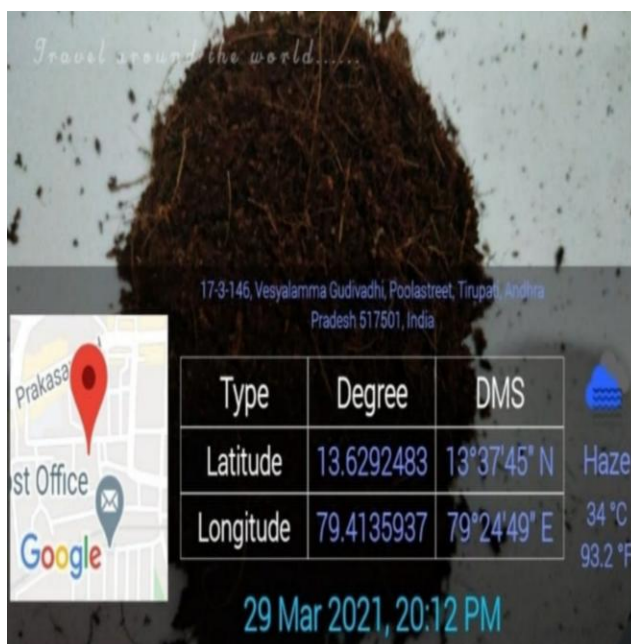


Fig 4.3.7 cocopeat

CHAPTER 5 RESULTS AND DISCUSSION :

5.1 purpose of using biodegradable matter to enhance plant growth.

Adding organic matter to soil leads to raises in organic carbon in it.

The organic matter which is essential for microorganisms living in the soil.

Those microorganisms convert nutrients into plant available minerals.

This organic matter amends the soil.

These organic matter increases porosity amount of space between soil particles promotes aeration and helps to moisture.

5.2 benefits of homemade compost from organic matter

The disposable organic matter or biodegradable waste in the kitchen boosts the life of the plant.

So there is no need to create an outdoor compost pile.

We can immediately use this foods scraps to nourish and reap the benefits.

These are 100% organic no cost and no packaging.

Improved microbial activity in soil which prevent plant diseases.

No environment in packs as in the case of manufacturing chemicals and fertilizers.

A remarkable production in home trash.

5.3 Inference :

We have taken seven types of seeds along with seven different types of homemade fertilizer from biodegradable matter.

Cowpeas-bone meal as a fertilizer

Groundnuts-eggshells as a fertilizer

Mustard seeds - cow dung as a fertilizer

Green gram- Coco peat as a fertilizer

Corn seeds- Neem cakes as a fertilizer

Coriander -vegetable peel as a fertilizer.

Black eyed peas- coffee grounds as a fertilizer.

Here we have observed the growth of plant on the basis of daily analysis by measuring seedling height using an inch tape and also we have recorded the seedling height on plant height with organic fertilizers whereas seedling height for plant height without organic fertilizers and we also observed morphological changes of seed from sprout to a plant.

Table 5.3.1 Cowpeas-Bone meal as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Cow peas	3 inches to 5cm from day 1 to day 30	2.7 inches to 4.2cm from day 1 to day 30

Table 5.3.2 Groundnuts-Neem cake as a fertilizer

Sl.No	Name of the seed	Seedling height with organic matter	Seedling height without organic matter
1	Ground nuts	2.4 inches to 10cm from day 1 to day 30	2.0 inches to 8cm from day 1 to day 30

Table 5.3.3 Mustard seeds -Cow dung as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Mustard seeds	6.1 inches to 4cm from day 1 to day 20	5.8 inches to 3.5cm from day 1 to day 20

Table 5.3.4 Green gram -Egg shells as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Green gram	3.6 inches to 2cm from day 1 to day 20	3.8 inches to 2cm from day 1 to day 20

Table 5.3.5 Corn -Coco peat as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Corn	3 inches to 5cm from day 1 to day 30	2.7 inches to 4.2cm from day 1 to day 30

Table 5.3.6 Coriander -Vegetable peel as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Coriander	3 inches to 5cm from day 1 to day 30	2.7 inches to 4.2cm from day 1 to day 30

Table 5.3.7 Black-eyed peas -Coffee grounds as a fertilizer

Sl.No	Name of the seeds	Seedling height with organic matter	Seedling height without organic matter
1	Black eyed peas	3 inches to 5cm from day 1 to day 30	2.7 inches to 4.2cm from day 1 to day 30

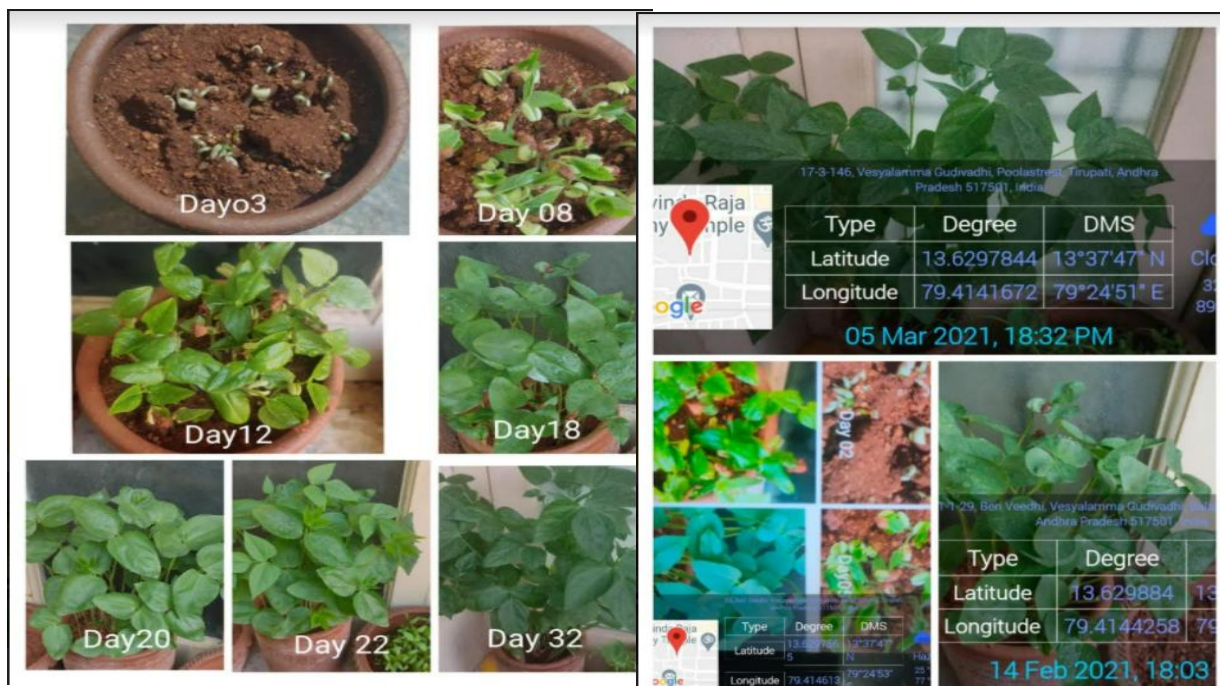


Figure 5.3.8 cow peas-Bone meal as a fertilizer

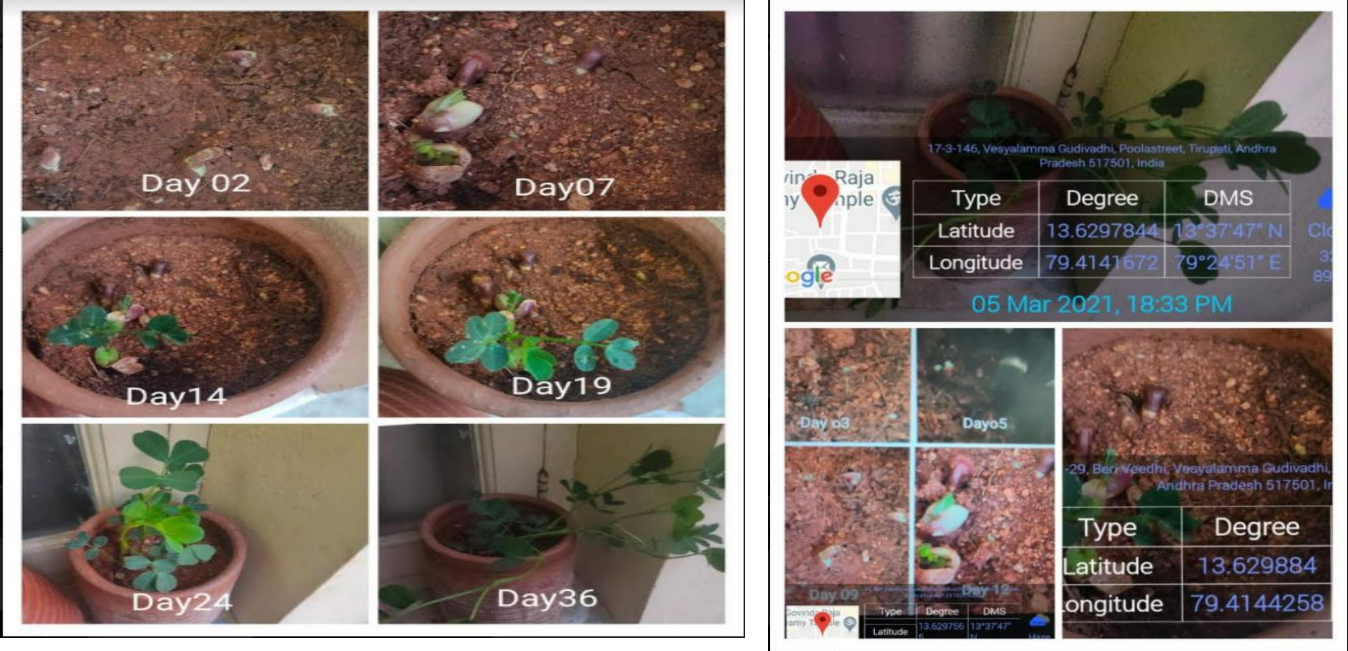


Figure 5.3.9 Ground nuts-Neem cake as a fertilizer

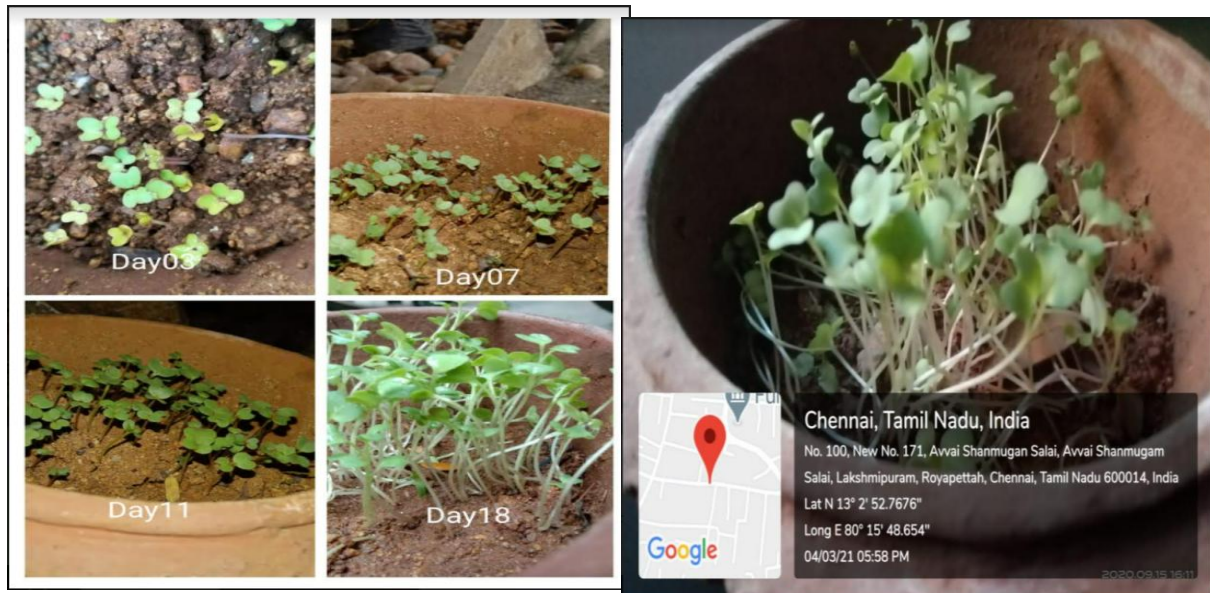


Figure 5.3.10 Mustard seeds-Cow dung as a fertilizer

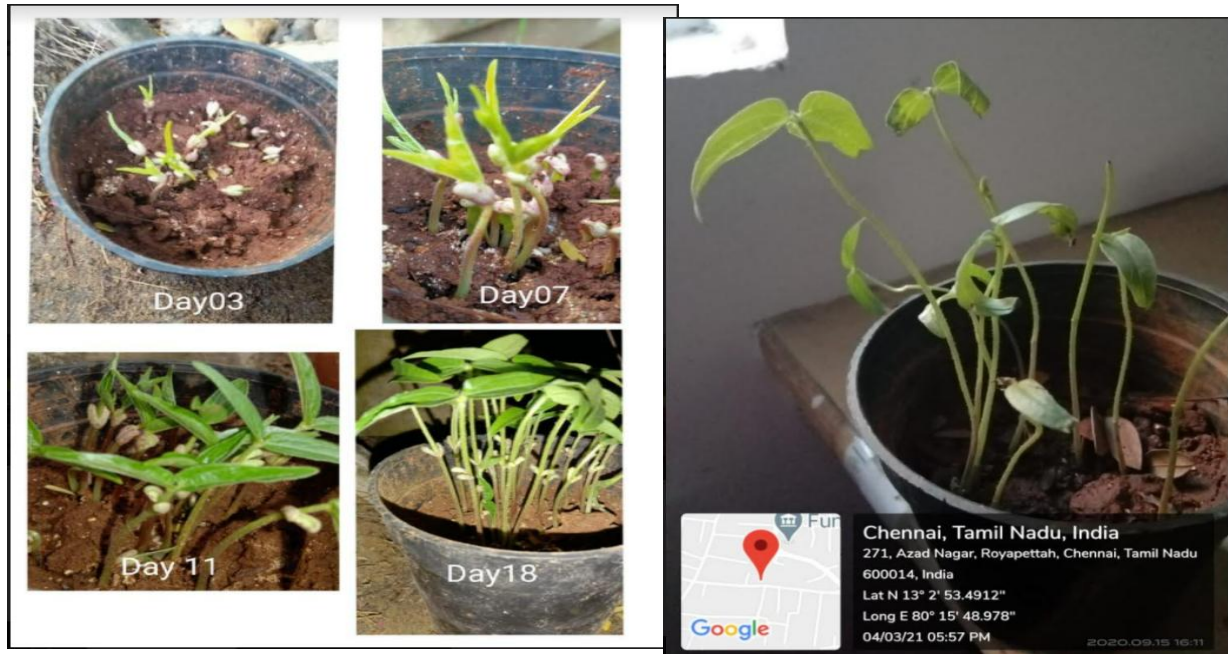


Figure 5.3 11 Green gram-Egg shells as a fertilizer

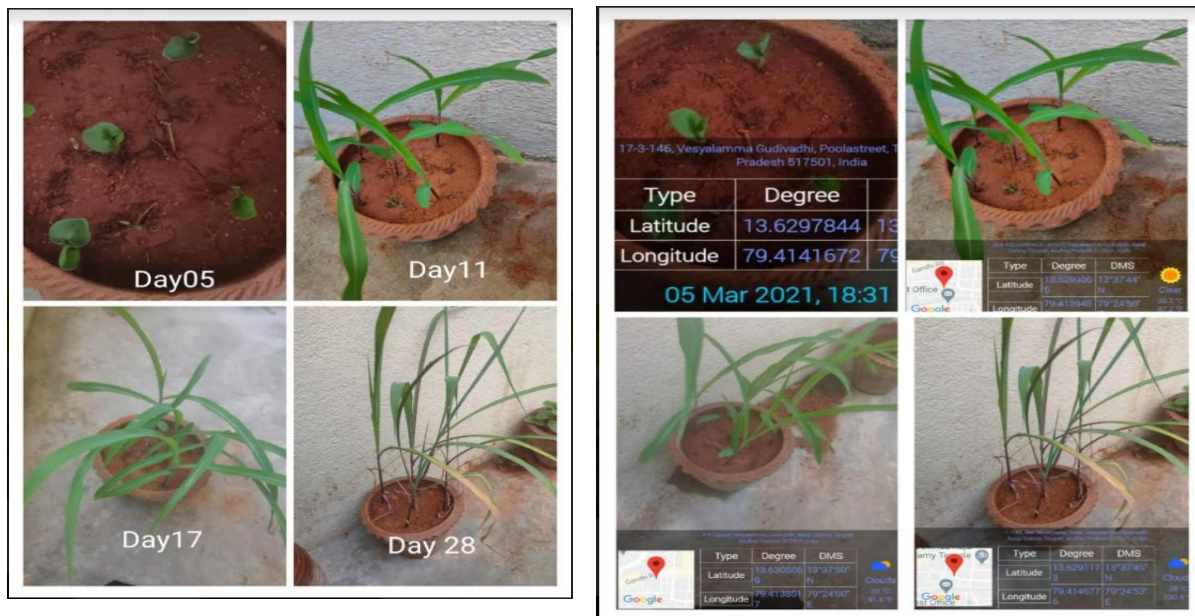


Figure 5.3 12 Corn-Coco peat as a fertilizer

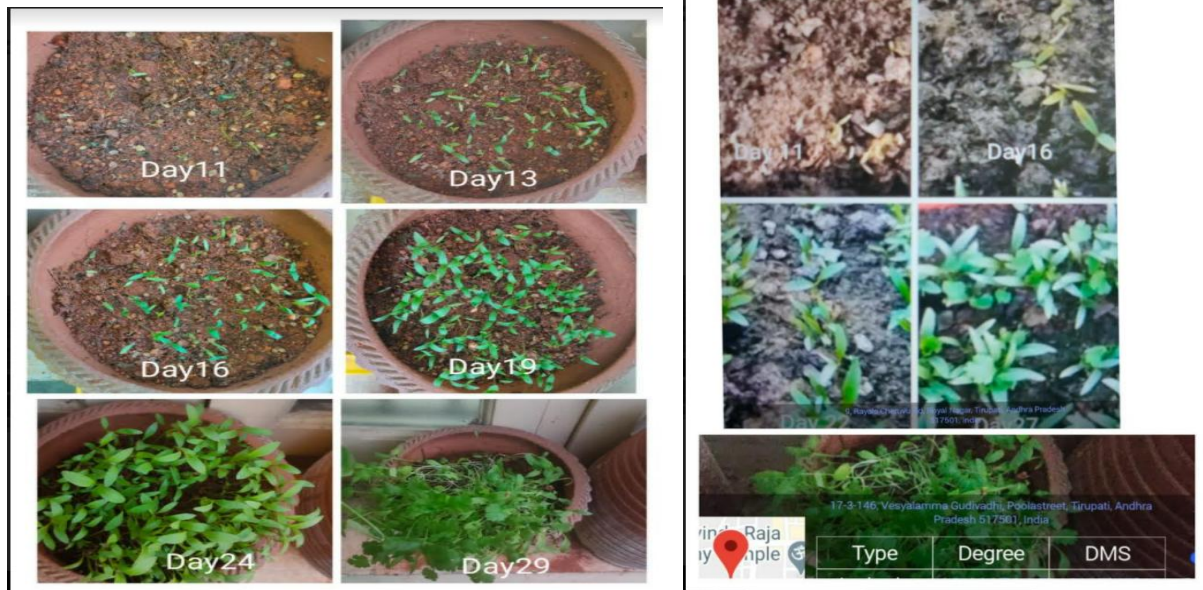


Figure 5.3.13 Coriander-vegetable peel as a fertilizer

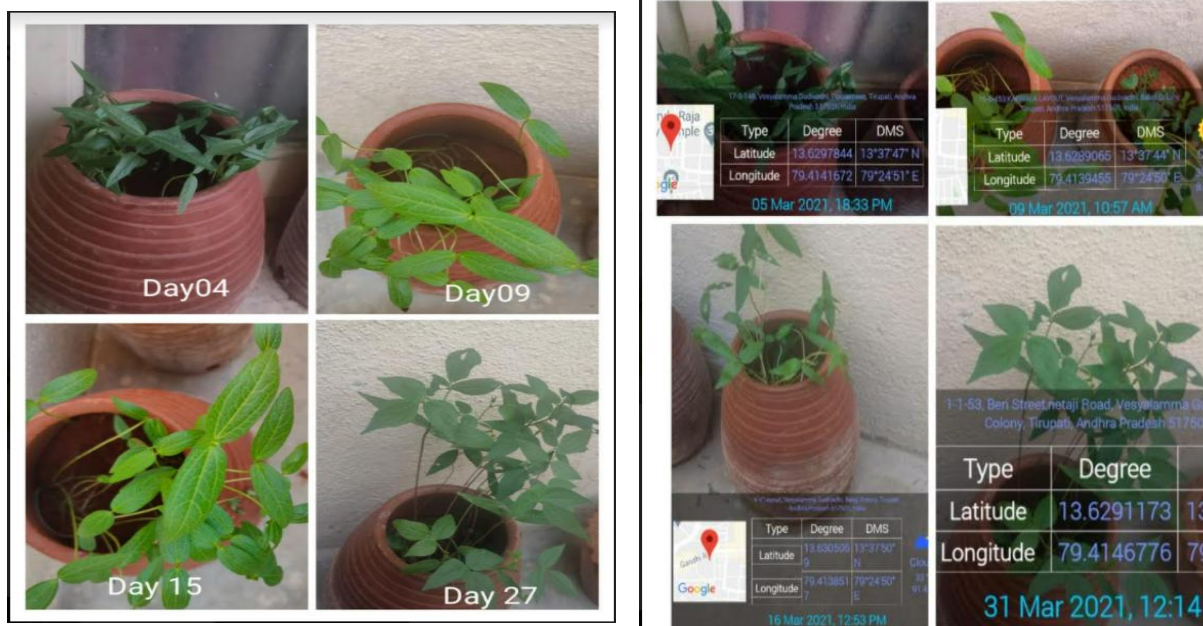


Figure 5.3.14 Black eyed peas-Coffee grounds as a fertilizer



5.3.15 Enhanced plant growth using biodegradable waste as an organic fertilizer.

CHAPTER 6 SUMMARY AND CONCLUSION

Plants obtain nutrients from two natural Sources organic matter and minerals organic matter includes any plant or animal material that returns to the soil and goes through the decomposition process in addition to providing nutrients and habitat to organisms living in the soil organic matter also bind soil particles into aggregates and improves the water holding capacity of soil most soils contain 2 to 10% organic matter however even in small amounts of organic matter is very important. application of organic manure had a significant positive effect on plant growth parameters such as plant height, length of internode, number of fruit branches, and stem diameter, and the effect was more pronounced under elevated temperature conditions. Organic manure treated at the 2× rate yielded the highest plant growth (plant height, length of internode, number of fruit branches, and stem diameter), was and was substantially higher than those of the 1× rate treatment at all temperature environments. Although a significant difference was not detected, the chlorophyll content of leaf and stem diameter parameters with application rate increase. However, compared to the field condition plant growth parameters such as plant height, stem diameter, dry weight of shoot and root, and number of fruit branches tended to be significantly higher under the greenhouse followed by rain-shelter house conditions. The application of organic manure at the 1× rate increased plant height and the number of fruit branch parameter.. in the greenhouse and by 23.3% and 26.1% in the rain-shelter house, respectively, compared to the field. Likewise, when organic manure was applied at the 1× rate, the length of internode increased by 44.7% and 34.3% in the greenhouse and rain-shelter house, respectively. Soil is a living dynamic ecosystem healthy soil is teeming with microscopic and larger organisms that perform many vital functions including converting dead and decaying matter as well as minerals to plant nutrients different soil organisms feed on different organic substrates. Their biological activity depends on the organic matter supply. The enhanced plant development in response to organic manure application is well-known exhibiting a significant steady increase in plant growth due to the improved nutrient conditions in the root rhizosphere. Although organic manure application did not bring any significant difference at the beginning of growing season, the growth parameters were significantly higher at both rates of organic manure treatment. The application of organic manure at the 1× and 2× rates significantly increased chilli pepper growth and N uptake, but the 1× rate treatment stabilized the biomass ratio x plant yield interrelations. However, the organic manure based nutrient management scheme efficiently increased plant growth in all combinations of elevated temperature.

Nutrients exchange between organic matter water and soil are essential to soil fertility and needed to be maintained for sustainable production purposes where the soil is exploited for crop production without restoring the organic matter and nutrient contents and maintaining a good structure.

The conclusion of my study was to utilize biodegradable waste as an organic fertilizer for the enhancement of plant growth and to improve soil fertility.

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