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RESEARCH ARTICLE

COMPOSITION, MANUFACTURE AND APPLICATION PROCEDURES FOR COMPOST, VERMICOMPOST AND VERMIWASH IN THE DEVELOPMENT OF ORGANIC CROP PRODUCTION

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Abstract

Modern horticulture as well as agriculture involves usage of pesticides and chemical fertilizers with an Essence of increasing the world's food production. But they also cause several health hazard, Researchers have found and suggested bio-fertilizers as an excellent alternative to chemical fertilizers.Vermicompost is considered as a high nutrient bio-fertilizer with diverse microbial communities. It plays a vital role in improving growth and yield of different field crops, vegetables, and flower and fruit crops. Vermiwash is rich in enzymes, plant growth hormones, and vitamins along with micro- and macro-nutrients. Vermicompost maintains the soil in a proper homeostatic state. Organic farming does not allow the use of synthetic chemical fertilizer, antibiotic, herbicides or pesticides. Thus the objective of organic farming is agriculture production of fibers, grains, vegetables, flowers, fruits, foods, and animal products such as milk, egg, and meat is the best natural way. Organic farming is a specific type of farming where no chemicals were added to the soil unless they are natural. The farmer must grow their crops naturally. India ranks 33 in world in terms of area under organic farming.

Introduction:-

India is a developing nation. Its economy is growing; poverty is still a major challenge. Infect based on the global bank 60% of the India lives under the standard global poverty line. Howevercovid -19 pandemic is expected to drive an additional people into extreme poverty, it has been estimated that one billion people in the world, suffer from hunger and malnutrition in their day to day life. Also the majority of hunger deaths are caused by chronic malnutrition. Conventional agricultural plays a pivotal role in the growth and survival of nations.

In order to increase the crop production for fulfilling the nutritional requirements of the day by day increasing the population and over the year's agriculture has undergone various scientific innovations in order to make it more efficient (Ajmal M et al (2018). Modern agriculture involves usage of pesticides and chemical fertilizers with an essence of increasing the world's food production, as these serve as fast. Food for plant causing them to grow more rapidly and efficiently.Continuous application of chemical fertilizers and pesticides tremendous harm and leads to decay of soil, quality and fertility, and affecting the fruit nutritional value and edibility (FarniaA,Hasanpur k (2015) hence in the recent years, many organic fertilizers have been introduced that act as natural stimulators for plant growth. A particular group of organic fertilizers includes outcomes based on plant growth promoting. Micro-

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organisms identified as bio-fertilizers. These bio- fertilizers add nutrients through the natural process of fixing. Atmospheric nitrogen or phosphate solubilizing micro-organisms. It has been analyzed that bio-fertilizers keep the soil environment rich in all kinds of micro- and macro-nutrients via nitrogen fixing plant growth regulating substances, (Sinha RK, Valani D, ChuhanK ,Agarwal S.) .

Vermicomposting is a chemical and biological process for recycling nutrients with the aid of earthworms and micro-organisms. Thus, vermicompost is considered as a high nutrient bio-fertilizer with diverse microbial communities (Pathma and Sakthieval 2013) vermicomposting technology is known throughout the world and considered as a widely spread popular technology, as process for handling organic residuals, it represents an alternative approach in waste management, neither landfilled nor burned but is considered a resource that may be recycled. It is a sustainable, cost effective, and ecological technology for efficient treatment of bio-degradable wastes, and is thus widely adopted to recycle hazardous and worthless organic wastes into safe and valuable products (Garg et al, 2006).

Earthworms consume various organic wastes and reduce the volume by 40-60%. Each earthworm weighs about 0.5 to 0.6g, eats waste equivalent to its body weight and produces cast equivalent to about 50% of the waste it consumes in a day. The moisture content of castings ranges between 32 and 66% and the PH is around 7.0 (Reddy et, al 1998).

The worm castings contain higher percentage (nearly two fold) of both macro and micro-nutrients than the garden compost. From earlier studies also it is evident that vermicompostprovides all nutrients in readily available form and also enhance uptake of nutrients by plants (Sreenivas at al, 2000).

Vermicomposting is the process of conversion of organic wastes into finely degraded peat like substances using earthworms. All composting methods can be used for the vermicomposting instead earthworms are used in vermicomposting after partial decomposition of the waste materials. Vermicomposting is a bio fertilizer enriched with all beneficial soil microbes and also contains all the essential plant nutrients like N,P AND K Vermicompost that is prepared through conventional method has standard values of total nitrogen 1.94% , phosphorus and potassium 0.70% it is also enriched with various micro-nutrients such as mg (0-46%) , Fe (7563ppm), Zn (278) ppm, Mn (475 PPM) Bo (34 ppm) Cu(27ppm) . Thus eliminate usage of any further artificial chemicals inputs. Further, nutrients in vermicompost are often much higher than traditional garden compost (Alan et al. 2007) vermicompost plays a major role in improving growth and yield of different field corps, vegetables, flower and fruit crops.

Batch systems are ones in which the bedding and food are mixed, the worms added, and nothing more is done until the process is complete. Continuous flow where upon feed and new bedding is added incrementally on a regular basis. Most commercial farm vermicomposting involves windrows which are long rows of cow manure. Farmers typically stack the manure in row 3 feet high and 3 feet wide, but the simplest form of vermicomposting involves a bin made from plastic or untreated, non- aromatic wood. some form of bedding , such as shredded paper or composted animal manure or decaying leaves, fills the bin are composted animal manure or decaying leaves, fills the bin and mixes with a few handful of soil to provide the worms with material through which to burrow. The bedding, such as shredded paper or composted animals manure or decaying leaved, fills the bin and mixes with a few handful of soil to provide the worms with material through which to burrow. The bedding also requires water to stay moist and allow the worms to breathe. Feed the worm organic food scraps such as vegetables, fruits tea, bags and coffee grounds. However, never compost meet, fish, or other fatty, oily foods; otherwise the bin will produce a foul odour. And the best worms for bin vermicomposting are red worms.

Vermiwash is a liquid that is collected after the passage of water through a column of worm action and is very useful as a foliar spray. It is a collection of excretory products and mucus secretion of earthworms along with micro-nutrients from the soil organic molecules. These are transported to the leaf, shoots and other parts of the plants in the natural ecosystem. Vermiwash, if collected properly, is a clear and transparent, pale yellow coloured fluid. It has been reported to have excellent growth promoting effects besides serving as bio pesticide vermiwash is a watery extract of vermicosmpost, extracted in the presence of rich population of earthworms and contains several enzymes, plant growth hormones, vitamins along with micro- and macro-nutrients which increases the resistance power of crops against various diseases and enhances the growth and productivity of crops (Zambara at al.2008) the increasing trend of abundant use of inorganic fertilizers along with herbicides and pesticides and exploiting available water resource etc, in the present agriculture system poses a great threat to the sustainability of our agro- ecosystem under such situation it is essential to look for alternatives which are effective and eco- friendly .the basic principle of vermiwash preparation is that worm worked soils have burrows formed by the earthworms. These burrows use inhabited richly by bacteria,

also called as the drilospheres. Water passing through these burrows washes the nutrients from burrows to the roots to be absorbed by the plants. This principle is applied in the preparation of vermiwash. In preparation of vermiwsh it takes around 40-50 days to get clear brown coloured liquid collected at the bottom of the barrel vermiwash is coelomic fluid extraction contains several enzymes , plant growth hormones like cytokines', gibberellins and vitamins along with micro-and macro-nutrients required for plant growth (Bucker field at al, 1999).

In vermiwash nitrogen present in the form of mucus, nitrogenous excretory substances growth stimulating hormones and enzymes (Tripathi and bhardewaj 2022) the PH and electrical conductivity was higher in the vermicompost compared to the vermiwash. The nitrogen content was 57% and potassium content was 79.6% higher in the vermicompost as compared to the vermiwash.

Vermicompost improving the soil texture, improving aeration, and helping plant roots anchor better in the earth, increasing the soil water retention capacity of soil. Enriches soil with micro- organisms.Improving water hold capacity, the worm castings are rich in humic acids, which condition the soil and helps in balance PH.In other words, organic farming does not allow the use of synthetic chemical fertilizer, antibiotic, herbicides,or pesticides. Thus the objection of organic farming is agricultural production of fish's grains vegetables flowers fruits floods and animal products. Such as milk egg and meat is the best natural way. Organic farming may be adopted, to increase genetic diversity. And promote more usage of natural pesticides. Inorganic farming is a technique that certain farmer uses to grow crops bigger and faster. These farmers are allowed to use chemicals and fertilizers. Organic farming is a specific type of farming where no chemicals were added to the soil unless they are natural. The farmer must grow their crops naturally.

Here is the major difference between organic and inorganic compounds. Compost and vermin-compost production practices should be described in the operations organic system plan (OSP) Certifying agents may allow the use of compost if they review the OSP and records and are assured that all requirements are met. Pros of organic farming includes organic food products contain very high nutrition content because they do not contain modified ingredients compare to the conventional agriculture food products. Another factor that makes them highly nutrition is that they are given time to develop and are provided with the best natural condition of growth.Apart from nutrition the mineral and the sugar structures in organic foods are tasty because the crops are given more time to develop and mature. The use of production techniques is reveled to be the reason for the better taste in organic food products. it is commonly reported that the taste of organic vegetables and fruits are of higher quality compared to those that are conventionally grown.

Organic reduce offers the safest products for human consumption compared to any other available food products. Organic products are high in nutrition content, they contain lower levels of chemicals and they do not have modified ingredients. Besides, organic standards have set strict regulations to ensure all products that are labeled organic are truly organic in production and processing which ensure that they are free from synthetic chemicals components and genetically modified production technologies.

Achieving tremendous environmental sustainability mileage is the dream of every nation in the world. This can be partly be achieved by the use of organic farming. Research reveals that organic farming can provide, impressive mechanism for advancing ecological harmony, biodiversity, biological cycles which are environmentally sustaining For example, the primary objectives of organic farming are soil management and conservation, promoting nutrient cycle, ecological balance and conserving bio- diversity. Environmental sustainability. Biodiversity, and biological cycles which are environmentally sustaining for example are soil management and conservation, promoting nutrient cycle, ecological balance and conserving biodiversity.

The demand against the supply of food has always been disproportionate due to the effects of climate change and poor farming practices that cause poor crop produce, various people around the globe are facing starvation and lack enough food supply as there is a general shortage of safe and nutrition's food to satisfy food preference and dietary needs for a healthy and active life. Contemporary world agricultural production goal is superior productivity. While organic farming promises improved and healthier produce, it is only beneficial in the short term as the massive inputs such as machinery and chemicals are out of the picture, by contrast, over the long term the productivity advantages diminish as the soil health and fertility declines over time in organic farming, so does the yields and this happens when the soil reaches the point where it can no longer convert the existing humus into soil fertility. It requires a lot of commitment, patience and uphill struggle to effectively grow crops organically organic farming needs a high amount of interaction between a farmer and his/ her crops or livestock. Weather it is ensuring the crops are pest and disease free in an

organic way or the use of natural methods to control weeds are raising animals in an organic way, the process is highly time consuming.

More skills are needed to farm organically compared to mechanical and chemical agriculture. This is greatly associated with the fact that the definitive aspect of organic farming maintains the use of natural inputs and close observation of the production process. Organic farmer lack the convenience of using mechanized or chemical techniques to fix every problem that is encountered.

Organic foods are the most expensive agricultural produces in the market. Perhaps this is one of the main reasons that organic farming is not fully supported as not so many people realize its great benefits. In the supermarkets, for instance, organic vegetables and fruits.Cost as much as 20 to 40 percent more than their non- organic equivalent. The consumers pay the price and this is said to be one of the major disadvantages of organically produced food products. The exorbitant prices of organic products are linked with the notion that organic farmers do not yield as much out of their farms as conventional farmers do cost as much as 20 to 40 percent more than their non- organic equivalent. The consumers pay the price and this is said to be one of the major disadvantages of organically produced food products. The exorbitant prices of organic products are linked with the notion that organic farmers do not yield as much out of their farms as conventional farmers do. In order to satisfy the increasing demand of organic products the organic farming sector in India has substantially increased over the count of year. India ranks 33 in world in terms of area under organic farming.

Conclusion:-

Vermicomposting is an alternative method for waste management through which vermicompost is produced with relatively high nutrient content than compost and manures. So it can be shift from chemical fertilizers to reduce the hazardous effect of chemicals to both crop and human being. Application of vermicompost either alone or in combination with fertilizers promotes crop yield. It is today's natural fertilizers as nature intended and it is the best solution to immediate problem of declining soil fertility and for production of food thus is the best means of abating pollution and discriminate use of chemical fertilizers .use of vermicompost constitutes an important alternative source of fertilizers that has environmental benefits , productivity and crop quality as compared to inorganic fertilizers vermicomposting and its application could be a better option and farmers need to be educated about the importance of vermicompost.

Organic and organic agriculture are terms that almost everyone has heard of these days, organic farming is an agricultural method that adheres to the principles of sustainable development. Its is an agricultural production management method that does not utilize pesticides, chemical fertilizers, industrial synthetic products, or genetically modified organisms. Organic agriculture contributes to long term development in society (health, employment, etc.) To promote the adoption of more organic and other novel farming systems, incentives for suitable markets, reform of farm – related laws and reorientation of publically supported agricultural science are required. Lower yields are less of a concern if society learns to value the other three characteristics of organic and other creative agricultural system, improved economic, social, and environmental sustainability.

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