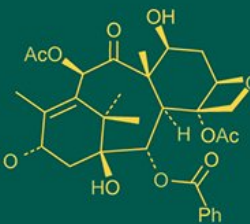
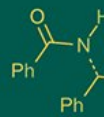
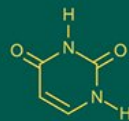
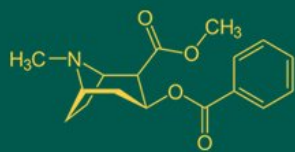


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S Senthilkumar
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Preethi S
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

S Manivannan
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Adithya SR
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

RS Afiya
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Prtyasha Acharya
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Gaurav Meena
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

K Abinaya
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Corresponding Author:
S Senthilkumar
Department of Horticulture,
Central University of Tamil
Nadu, Thiruvavur, Tamil
Nadu, India

Essentiality and utility of compost teas in suppressing diseases of horticultural crops

S Senthilkumar, Preethi S, S Manivannan, Adithya SR, RS Afiya, Prtyasha Acharya, Gaurav Meena and K Abinaya

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Abstract

Excessive reliance on chemical pesticides has contributed to environmental degradation and raised concerns regarding their sustainability and long term effectiveness in crop protection. Moreover, chemical pesticides often fail to control many plant diseases efficiently, highlighting the need for safer, holistic alternatives. Compost teas have emerged as a promising tool in sustainable and organic agriculture due to their ability to improve soil health while naturally suppressing plant pathogens. Although the benefits of compost in enhancing soil biological activity, nutrient cycling and structural quality have been well recognized for decades, growing attention is now directed toward liquid compost extracts. These compost teas contain a diverse mixture of microorganisms, nutrients and bioactive compounds that collectively contribute to improved plant vigor and natural disease resistance. Historically, liquid compost formulations trace back to traditional gardening practices, where seeds and seedlings were treated with plant and soil extracts to reduce damping-off and promote early growth. Modern research validates these age-old observations, demonstrating that compost teas whether applied as foliar sprays or soil drenches can suppress a wide spectrum of soil-borne and foliar diseases. However, the microbial complexity of compost teas makes it difficult to fully elucidate their suppression mechanisms. Consistently, non-sterilized compost teas exhibit stronger disease-controlling effects than sterilized versions, emphasizing the critical role of living microbial communities, although chemical and physical factors may also contribute. Compost teas have shown significant suppressive effects against major plant diseases such as grey mould, apple scab, powdery mildew, downy mildew, collar rot and damping off. Their increasing adoption by environmentally conscious farmers reflects their potential as eco-friendly inputs that enhance soil quality, plant health and overall agricultural sustainability. This review, clearly explains the types of compost teas, their preparation methods, microbial and biochemical mechanisms of disease suppression, and their practical applications in sustainable crop production.

Keywords: Compost teas, disease suppression, sustainable agriculture, soil microbial communities, organic crop management

Introduction

Growing concern over the environmental impacts of synthetic pesticides and the limited availability of effective disease management tools in organic farming systems has intensified the search for sustainable alternatives. Among the various biological inputs explored in recent decades, compost-derived liquids particularly compost tea and compost water extracts have gained considerable attention for their potential to suppress plant pathogens while promoting overall crop health. Numerous studies have demonstrated the effectiveness of these water based preparations in reducing the incidence of several soil-borne and foliar diseases, making compost teas a promising component of integrated pest management strategies (Al-Mughrabi, 2006; Scheuerell and Mahaffee, 2002; Scheuerell and Mahaffee, 2004; McGrath, 2004; Al Dahmani *et al.*, 2003) [5, 64, 65, 2]. Compost teas contain a diverse mixture of beneficial microorganisms, soluble nutrients, and bioactive compounds extracted from mature compost. Their efficacy, however, can vary widely depending on several factors, including compost quality, brewing conditions, aeration, dilution, and application schedule. These variables influence the microbial composition and chemical profile of the tea, often leading to inconsistent disease suppression across different production systems. Despite the contributions of physicochemical constituents, research strongly suggests that

Biological activity particularly the presence of antagonistic microorganisms is primarily responsible for the suppressive effects observed. Aerated liquid extraction of composted degradable organic compounds are the typical source of aerated compost Teas, which are liquid products (Ingham *et al.*, 2000). Both Aerated Compost Teas (ACTs) and non-aerated compost teas have been shown to inhibit important plant pathogens such as *Pythium ultimum*, *Rhizoctonia solani*, *Phytophthora capsici*, *Fusarium oxysporum*, and *Verticillium dahliae* (Alfano *et al.*, 2011). Studies have also reported reduced disease incidence when compost extracts are applied as foliar sprays or soil drenches, supporting their potential role in managing damping off, root rots and wilt diseases (Scheuerell & Mahaffee, 2002) [65]. *Fusarium oxysporum* was shown to be suppressed when inoculated tomato seedlings were transplanted onto peat that had been treated with compost extract (Hibar *et al.*, 2005). It has been demonstrated that the use of aqueous compost extracts can reduce both necrotrophic and biotrophic disease (Weltzien, 1989; Fokkema, 1993; Al-Dahmani *et al.*, 2003) as well as also aqueous extracts of vermicompost have been shown to depress soil borne pathogens and pests (Szczech *et al.*, 1993; Nakasone *et al.*, 1999; Orlikowski, 1999; Rodriguez *et al.*, 2000). In addition to their biocontrol properties, compost teas function as natural biostimulants by supplying soluble nutrients that enhance plant growth (Diver, 2002). As environmentally conscious growers increasingly adopt compost teas, understanding their preparation, mechanisms of action, and practical applications becomes essential. This review examines the scientific basis, production variables, microbial ecology, disease suppression mechanisms, and agricultural relevance of compost teas, providing a comprehensive overview of their role in sustainable crop protection.

Compost tea and its types

Leachate is frequently confused for compost tea since it is made from the liquid that drains from compost pits. Leachate, however, cannot be employed in plants as successfully as compost tea. Compost tea is a beverage made by utilizing a brewing technique to extract beneficial microorganisms (microbes) from compost including fungi, bacteria, protozoa, nematodes and small arthropods. Aerated Compost Tea (ACT) is a compost tea that has been aerated using an aerator, oxygen is introduced into the container during the fermentation process. In order to maintain aerobic conditions, "aerated compost tea" has been defined as the end result of spraying recirculating water through a permeable bag of compost floating over an open tank (Riggle, 1996). The end result of this process has alternatively been referred to as "organic tea" (Merrill and McKeon, 2001) and "aerated compost tea" (Pscheidt and Wittig, 1996). The microbes must ferment for between 24 and 48 hours to three days. The compost, water, and other components are simply combined to make non-aerated teas, which are then left to ferment undisturbed. The traditional approach involves a "inert" brewing procedure that excludes the addition of oxygen. The method of making Non-aerated Compost Tea (NCT) has been described to as anaerobic (no oxygen) method. The normal brewing period for NCT is 14 days. Non-aerated fermentations are referred to as compost extracts, watery fermented compost extracts, modified extracts, compost steepage and compost slurry. The terms "compost extract,"

"watery fermented compost extract," and "steepage" are used to describe a compost tea made by fermenting the substrate in an open tank with compost and water mixed in a ratio of 1:5 to 1:10 without agitating it for a set period of time (Scheuerell *et al.*, 2002). Compost extracts that are mixed with isolated microbes or fermented with an addition of particular nutrients are known as "amended extracts" (Weltzien, 1991). Prior to filtration, "compost slurry" is a non-aerated compost tea (Cronin *et al.*, 1996).

Characteristic of fermented compost tea

The characteristics of fermented compost tea are strongly influenced by several key factors. Compost-to-water ratio is critical: while historical studies report ratios from 1:1 to 1:50, most effective brewing protocols recommend between 1:3 and 1:10 (v/v) Weltzien (1990). Diluting the end spray would probably have a different outcome than diluting the start fermentation ratio since the initial ratio might impact the rate of oxygen loss during the fermentation (Cronin *et al.*, 1996; Merrill and McKeon, 2001). A recent meta-analysis also noted that lower ratios (such as 1:5 or 1:10) balance microbial concentration and nutrient content well Campana *et al.*, (2025) [14]. Very dilute teas (e.g., 1:50) can reduce microbial density, while very concentrated brews might promote oxygen depletion during fermentation Bonanomi *et al.*, (2025) [9] and Campana *et al.*, (2025) [14]. The carbon-to-nitrogen (C: N) ratio of the compost feedstock further shapes the microbial community in the tea. While traditional composts with a C: N around 30:1 support a rich diversity of bacteria, fungi, and other soil organisms. (South Carolina Department of Health and Environmental Control, 2004). But slight variations (ratios between ~26–35) still maintain robust microbial activity without compromising the balance Elhaggar *et al.*, (2017) [27]. Dissolved Oxygen (DO) is another vital parameter. For aerated compost teas, studies recommend that DO levels stay above ~5.5 ppm (or around 60% saturation) to sustain aerobic microbes during brewing. (Ingham 2000). Adequate oxygenation ensures high metabolic activity and prevents the brew from shifting toward anaerobic, potentially harmful microbial populations Campana *et al.* (2025) [14]. Finally, the age and maturity of the compost being used also matter. Mature composts (with lower C:N ratios) foster greater microbial diversity and functionality in the extracted tea Bonanomi *et al.* (2025) [9].

Microbial diversity in compost tea and their threshold level

Microbial diversity can be gauged by methods like, DNA based technique (RFLPs) (Michel *et al.*, 2002), DGCE (Denaturing gradient gel electrophoresis) (Calvo bado *et al.*, 2003). Greater the diversity of microbial community in the aerobic extracted tea, greater will be the disease suppressive activity and more nutrients (Soil Food Web, 2007). Understanding the microbial diversity is of prime important to study the mechanism by which they act. Microbial population in the compost tea belongs to genera's mentioned below (Scheuerell and Mahaffee, 2002; Ingham, 2005; De Corato, 2021). *Trichoderma*, *Bacillus*, *Penicillium*, *Aspergillus*, *Enterobacter* and *Rhizobacteria* are the major microorganisms in compost tea. Among the microbiome of Aerated compost tea and Non-aerated compost tea, the prevalence of bacteria was predominant in ACT (Weltzien, 1991) and (Ingham, 2005). A good quality compost tea

should have atleast 106 cfu/ml of bacteria in order to impose suppressive action on the pathogen (Scheuerell and Mahaffee, 2004) ^[64]. Marin *et al.* (2015) reported that in the study conducted using compost teas from sources like crop residue compost, vermicompost, grape marc compost and spent mushroom compost, the bacterial population was greater than 106 cfu/ml. Method of preparation, application and the system of microorganism all together determines the potentiality of compost tea in disease control. The minimum concentration of microbes as given by Diver (2002) is mentioned in the table 1.

Table 1: Minimum concentration of microbes

Microorganism	Minimum concentration
Active bacteria	10-150 µg/ml of compost tea
Total bacteria	150-300 µg/ml of compost tea
Active fungi	2-10 µg/ml of compost tea
Total fungi	5-20 µg/ml of compost tea
Flagellates	1000
Amoebas	1000
Ciliates	20-50
Beneficial nematodes	2-10

Enhancing microbial community

Feed stocks like kelp, rock dust, humic acid and fulvic acid can be mixed to compost extract to increase the population of microbes (Grace, 2005). The ACT fermented with kelp, humic acids and rock dust (also known as a fungal addition) worked effectively in suppressing damping off disease caused by *Pythium ultimum* Scheuerell and Mahaffee, (2004) ^[27]. Compost tea fortification with microbial substrates has also been attempted to increase its biological activity.

Method of preparation of compost tea

Compost tea can be extracted from compost made from various sources like crop residue, animal manure, spent mushroom, vermicompost etc. The preparation methods differ mainly in whether or not aeration is applied during brewing. The two major approaches are Aerated Compost Tea (ACT) and Non-Aerated Compost Tea (NCT), along with a few modified techniques.

Aerated compost tea - preparation

Various systems are currently in use for aerated production, which requires mechanics and energy for continuous air addition. Common aeration designs include injecting air through a hollow propeller shaft, showering recirculated water through a porous compost bag suspended over an open tank (Cantisano 1995; Riggle 1996; Merrill and Mckee, 2001), recirculating water through a vortex nozzle mounted above a tank (Ingham and Alms, 1999), venturi nozzles aquarium stones (Ingham, 2000) or using fine bubble diffusion mats. Aerated compost tea preparation involves less time (24 and 72 hours).

Non-aerated compost tea - preparation

The conventional method for making NCT involves stirring together one volume of compost and four to ten volumes of water in an open container, letting the mixture sit undisturbed at 15 to 25°C for at least three days, and then harvesting the product (Weltzien, 1991). In order to perhaps encourage the release of microbes from compost particles during the fermentation, stirring should be done every two to three days (Brinton *et al.*, 1996). The sizes of containers range from

several thousand liters to tiny buckets. Non-aerated compost tea preparation costs very low with reduced input of energy. Another method involves discharging water directly into a spray tank after it has been filtered through bags packed with compost (Diver, 1998).

Method of usage

Compost extract can be used for disease suppression in two ways namely foliar spray (Scheuerell and Mahaffee, 2006) ^[26] and soil drenching to the root area (Al-Mughrabi, 2006). Compost teas are filtered to remove any detritus that may block the spraying machines and then sprayed (Brinton *et al.*, 1996; Ingham, 2000). Aerated compost tea when sterilized using autoclave or filtered using microfilters leads to loss of their ability to suppress diseases. This shows that the microbial load in the compost teas contributes in their ability to suppress diseases (Weltzien, 1991). The use of watery compost extracts versus soil applied composts differs in that the latter act more slowly over a longer period of time and require much larger amounts, while the former give immediate but very short-term control of surface spreading pathogens.

Role of compost tea in plants and the mechanism behind its action

Compost tea nurture the growth of plants and also has a role in suppression of diseases caused by above ground and soil borne. Improvement in the nutritional profile of the plant is due to, either the physio-chemical attributes or humic substance in the compost tea or due to undeviating toxic effect on the plant pathogens/development of resistance to the pathogen (Kone, 2010). Moreover, compost teas are known to be an effective bio-control agent by facilitating beneficial microorganism's growth on the leaf and root (Dianez *et al.*, 2006). There is evidence that various mechanisms used by compost teas to suppress plant diseases. Microbial content of compost teas is the major reason behind their potentiality to prevent plant disease. Suppression of foliar pathogens has been attributed to a number of pathogen suppression mechanisms, including competition, metabolites, antibiosis, and resistance-induced mechanisms (Elmer and Reglinski, 2006). Out of which hyper parasitism and Antibiosis are most used mechanisms. Compost teas also trigger the plants natural defense mechanism against pathogen (Zhang *et al.*, 1998). Al- Mughrabi *et al.* (2008) claim that the microorganisms in compost tea have the ability to engage in antagonism, antibiosis, compete for nutrients and resources, parasitically eliminate infections, produce antimicrobial compounds, or cause widespread resistance in plants. Microorganisms settle in the crevices of the leaf and feed on the exudates produced by plants which is used by the pathogen causing disease (Diver, 2002). Other studies suggested that the physicochemical characteristics of compost teas, particularly the organic molecules and nutrients like humic substances or phenolic substances, may protect the plant against disease through enhanced nutrient availability, immediate toxicity towards the infectious agent, or trigger systemic resistance (Hoitink *et al.*, 1997; Siddiqui *et al.*, 2009) ^[14-15, 31]. It is probable that microbe antagonists have a variety of methods of action that help to suppress disease given the large microbial community that was found in the compost tea used in this study. Numerous studies indicate that using the microbial element in compost tea is necessary to

avoid sickness (Scheuerell and Mahaffee, 2002) [23]. Because they include beneficial bacteria and chemical compounds like phenol compounds and amino acids, teas made from compost are well known for being effective natural disease inhibitors (Zhang *et al.*, 1998). The release of anti-microbial compounds by particular types of *Trichoderma* sp., *Pseudomonas*, and *Bacillus* has been demonstrated to have a detrimental effect on the structure of fungal mycelium. Additionally, the volatile compounds that microbes in the compost teas create may aid in preventing the development of infections (Sariah, 1994). The effectiveness of siderophores exist in grape marc tea (compost tea) for the inhibition of pathogenic fungi in plants was studied by (Dianez *et al.*, 2006). The suppressiveness demonstrated by grape marc compost extracts is a result of a variety of variables, including, antibiosis, competition for nutrition, development of lytic enzymes outside of the cells, and the presence of low molecular weight compounds that can degrade the fungal wall.

Applications of compost tea in suppression of diseases in horticultural crops

Tomato: Compost made from leaves and stems of various Cupressaceae species, along with grass clippings, and vermicompost; tomato plants showed suppressive effects on *Rhizoctonia solani* and *Fusarium oxysporum* f. sp. *Lycopersici* (Morales-Corts *et al.*, 2018) [18]. *Alternaria alternata*, *Pyrenochaeta lycopersici* and *Botrytis cinerea*, were used to evaluate the suppressive effect of whey compost tea on tomato plants. The results of plate challenge that the whey compost tea suppressed the mycelial growth of *Alternaria alternata*, *Pyrenochaeta lycopersici* and *Botrytis cinerea* (Pane *et al.*, 2012) [21]. Similar findings were consistent with recently made public preliminary findings regarding how in vitro suppressive qualities of compost teas used to treat a range of plant ailments. A tree bark compost tea's significant suppressive effects against the disease *Alternaria tomatophila* were also shown by Kouyoumjian, (2007) [16]. Segarra *et al.* (2009) [25] conducted research on the use of compost tea applied topically to control powdery mildew (*Erysiphe polygoni*) on tomato plants. When compost tea was applied to tomato leaves, the white patches that are indicative of *E. polygoni* powdery mildew infection vanished and were replaced by yellow dots that, when viewed under a microscope, seemed to be areas with little to no pathogen mycelium. The powdery mildew produced by *Erysiphe polygoni* on tomato plants was inhibited by the chemical and microbiological composition of the compost tea, with the curative effect (100%) being more effective than the preventive effect (19%). Dionne *et al.* (2012) [8] studied the impact of non-aerated compost teas on tomato pathogens that cause damping-off. In vitro growth of tomato root pathogens as well as the development of damping-off diseases brought on by *Pythium ultimum* and *Rhizoctonia solani* were tested for their effects by Non-aerated Compost Teas (NCT) made from seaweed, shrimp powder, chicken, bovine and sheep manure composts. The results shown that in vitro mycelial growth of *P. ultimum*, *R. solani*, *Fusarium oxysporum* f. sp. *radicis-lycopersici*, and *Verticillium dahliae* could be significantly reduced by NCT made from the five types of compost. The inhibitory impact of the NCT on the pathogens' mycelial development was completely or partially lost after sterilisation. In laboratory growth of tomato root pathogens as well as the emergence of damping-off diseases by

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Potato: It has been demonstrated that the use of organic tea or compost tea extractions can modestly to dramatically suppress a variety of plant diseases, including potato late blight (Weltzein, 1989). Compost tea has been extensively studied in order to promote plant development and defence against *R. solani* in potato plants. Two potato kinds (Agria and Hermes) were used in the study, and they were treated in the same way with compost tea prepared from garden trash. The results showed that *Rhizoctonia solani* resistance was increased in plants treated with CT, despite Hermes being the type grown was most sensitive. Furthermore, plants subjected to CT shown enhancements in yield, shoot quantity, tuber size, tuber weight, and potato germination, especially in plants subjected to a very high CT dose. In the particular CT under study, 7.4 x 10⁴cfu mL⁻¹ of actinobacteria and 2.7 x10²cfu mL⁻¹ of *Trichoderma* sp. were found. Aerated and non-aerated CT application results in a reduction of *R. solani* mycelial development under in vitro circumstances, in addition to the prior statement (Dionne *et al.*, 2012; Tian and Zheng, 2013; Gonzalez-Hernandez *et al.*, 2021) [31]. *Rhizoctonia* infestation in genotypes was noticeably less severe after the use of CT treatments. The bacteria that were transferred from the manure to the extract are causing this suppressive effect. According to Siddiquee *et al.* (2017) [70], *Trichoderma* spp. is one of the bacteria that helps to the last stages of composting by degrading organic materials. The species of this genus are among the most commonly used biocontrol agents due to their direct activity and capacity to trigger plant defensive mechanisms (Verma *et al.*, 2007; Joos *et al.*, 2020) [83, 40], Abdel-Hamid *et al.* (2016) [1] revealed that the compost and compost tea used to treat streptomyces scabies, which causes potato common scab. To investigate the effectiveness of compost tea and compost on the occurrence and severity of potato common scab, two field experiments were carried out. When compared to the untreated control, the application of compost or compost tea to potato plants of the cv. Berna variety dramatically reduced the severity of common scab and the quantity of scabbed tubers. Compost, as opposed to compost tea, was more suppressive against potato common scab. Research was done to find out how compost type, aeration, and brewing duration affected the qualities of compost tea, its phytotoxicity, and

how well it inhibited *Pythium ultimum* fungi's in vitro development Martin *et al.*, (2012) ^[74].

Okra

Compost teas made from crop residue compost like Rice Straw (RST) and Empty Fruit Bunches (EFB) of oil palm, was used to evaluate the suppressive effect against *Choanephora cucurbitarum* L., causing wet rot of okra (Siddiqui *et al.*, 2009) ^[31]. Both sterilized and non-sterilized compost teas were used against *C. cucurbitarum* growth. The conidial germination was hampered using non-sterilized compost of RST and EFB to about 84% and 79% correspondingly. The heat sterilized and filtered compost teas has reduced suppression in conidial germination. The enzymes like peroxidase (PO), polyphenol oxidase (PPO) and phenylalanine ammonia lyase (PAL) had role in suppression of disease, along with the high nutritive content and microbial population in non-sterilized compost tea. Development of *Choanephora* wet rot was slowed with an increase in total PO, PPO, and PAL activity, supporting the potential role of induced resistance.

Beans: McQuilken *et al.*, (1994) and Urban *et al.*, (1993) evaluated the ability of non-aerated tea from compost prepared from horse bedding, chicken litter, and cow manure to prevent *Botrytis cinerea* in beans, and both groups came up with encouraging results. Compost Tea prepared from the compost of cow and horse dung had high suppressivity against *Botrytis cinerea*, *Alternaria alternata*, and *Pyrenochaeta lycopersici* in Faba Beans. (Tegegn, 2017) ^[32]. Compost Tea prepared from the compost of grape and animal manure showed significant reduction in the infestation of *Rizoctonia solani* in beans (Nofal *et al.*, 2021) ^[20].

Lettuce, onion and chard: The use of Non-aerated Compost Tea of Horse bedding, chicken litter in control of *Botrytis cinerea* in Lettuce was experimented (McQuilken *et al.*, 1994). Compost tea application resulted in significantly increased yield of about 21% for lettuce, 58% for onion and 110% for chard (Bonanomi *et al.*, 2025) ^[9].

Pepper: The use of Compost tea obtained from cattle manure, horse manure and grape marc to control *Botrytis cinerae* in peppe and got positive result (Stindt, 1990). Effective control was attained over vascular fusariosis in peppers caused by *Fusarium oxysporum* f. sp. *vasinfectum* and in cucumbers caused by *Fusarium oxysporum* f. sp. *Cucumerinum* (Ma *et al.*, 1999). Compost tea prepared from compost of green and pruning wastes showed inhibition on *Rhizoctonia solani* and *Phytophthora capsica* (González-Hernández *et al.*, 2022) ^[30]. Compost tea prepared from vermicompost and compost of mushroom and grape showed a suppressive effect of *Phytophthora capsici* and *Phytophthora parasitica* in pepper Durmus *et al.*, (2022).

Cucumber: The use of Compost tea of carious to control *Sphaerotheca fuliginea* in Cucumber (Samerski and Weltzien, 1988).

Spinach: The compost derived from onion and vineyard, when enriched with beneficial microorganisms, exhibits suppressive effects and offers protection against *Rhizoctonia solani* (Ros *et al.*, 2020).

Pea: Pea wilt caused by *Pythium ultimum* was treated with nonaerated compost tea and has been reported with positive results (Trankner, 1992).

Strawberry: Compost tea obtained from cattle manure and Compost tea of Horse manure was used to control *Botrytis cinerea* in strawberry (Stindt, 1990).

Grapes: The use of Non-aerated Compost Tea obtained from Horse - straw-soil in control of *Botrytis cinerea* and *Plasmaporaviticola* in Grapes was experimented (Ketterer *et al.*, 1992).

Apple: The fungus *Venturia inaequalis*, which causes apple scab, can be managed with compost tea made from spent mushroom compost (SMC). Due to heat stable chemicals generated by anaerobic microbes during the incubation of the compost slurry, compost tea inhibits conidia germination in *V. inaequalis* by 98% (Yohalem *et al.*, 1996).

Geranium: The ability of compost tea to control grey mould (*Botrytis cinerea*) on the geranium was investigated using a variety of production factors, including compost source, aeration, nutrient additions, production time, and application adjuvant usage and was concluded that due to manufacturing limitations, disease control would not be financially feasible until there are no other possibilities, according to the heterogeneity in grey mould control from NCT and ACT applications (Scheuerell *et al.*, 2006) ^[67].

Rose: The use of Compost tea obtained from yard debris, mixed source and chicken manure to control *Sphaerotheca pannosain var rose*. Three variables were tested: the various compost tea varieties (aerated and non-aerated compost tea, as well as oxygenated and non-aerated vermicompost tea), the dose (1:8 and 1:16 compost: water), and the frequency (once and twice per week) of spraying. Based on the findings of the experiments, aerated compost tea with a 1:8 dilution applied twice a week was shown to be the best treatment combination for preventing rose powdery mildew (Seddighand Kiani, 2018) ^[68].

Conclusion

Compost teas and compost extracts have shown strong potential in managing plant diseases and suppressing phytopathogens. Their effectiveness makes them especially valuable in organic farming, where disease-control options are limited. However, factors such as compost quality, brewing conditions, aeration, dilution, and application practices can influence their consistency and performance. Continued research on their composition, preparation methods, and mechanisms of action will help refine their use and integrate them more effectively with other biological control strategies. Collaborative efforts among farmers, composting specialists, and plant health experts are essential to fully evaluate and optimize compost tea as a component of integrated plant disease management.

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