Feasibility Of Halophytic Plants-Based Composts And Compost Tea On Soil Health, Crop Protection And Production

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Abstract

Earlier studies on organic agriculture helped to spur increased interest in composting and compost use, and gave way to the development of commercial composting facilities that supply finished compost products to horticultural producers. Composts are beneficial by providing a nutrient supply, reducing nutrient losses and improving cation exchange capacity (CEC), promoting better plant survival and growth, reducing soil compaction, improving soil water holding capacity (WHC), controlling erosion and providing weed suppression. An increasing body of experimental evidence indicates that plant diseases can also be suppressed by foliar application of compost extracts. The factors that influence pathogen suppression include choice of compost feedstocks, compost age, added nutrients, temperature and pH. The detailed studies on compost tea microbiology bring out the possibility to modify the production methods and application technology for better action. This review discusses current practices and issues related to the uses and benefits of plant-based composts and compost tea in the horticultural industry with emphasis on halophytic vegetal feedstock materials as potential substrate for vegetable crop production.

Keywords: Compost tea, halophytic feedstock, soil health, pathogenic resistance

I. Introduction

Conventional systems of agricultural production, the misuse and excessive use of chemical-based fertilizers and pesticides, have often adversely affect the environment and create many problems in human and animal health as well as in food safety and quality. Agricultural systems which conform to the principles of natural ecosystems are now receiving a great deal of attention in both developed and developing countries. As reported by Nyamangara et. al. (2003), management of soil organic matter by using composted organic waste is the key for sustainable agriculture. Increasing soil organic matter has the added benefit of improving soil quality and thereby enhancing the long-term sustainability of agriculture (Laird et al., 2001). Composted organic material is being applied on agricultural fields as an amendment to provide nutrients and also to enhance the organic matter content and improve the physical and chemical properties of the cultivated soils. Land application of composted material as a fertilizer source not only provides essential nutrients to plants, it also improves soil quality and effectively disposes of wastes. This review summarize much of the current research findings on the feasibility of plant-based compost and compost extracts (tea) on soil properties, soil fertility, crop yield, economic returns and crop protection.

II. Compost & Compost Tea

Little or no fertilizer application in the traditional conventional farming system has often been associated with a decline in soil fertility with subsequent reduction in crop yields and the use of inorganic fertilizers cause problems for human health and environment (Ayoola and Makinde, 2007). The application of composted organic wastes, which slowly release significant amounts of nitrogen and phosphorus is the recommended practice for improvement of the soil quality and soil fertility in tropical regions (Eghball, 2001). The earliest known written reference to composting is found on clay tablets dated to the Akkadian empire, roughly 2300 B.C. and again in Roman literature and biblical references. There is evidence that the Romans used compost teas and the ancient Egyptians used preparations based on compost or manure extracts as long as 4,000 years ago (Koepf, 1992). The use of solid residues for the rational production of compost has started about a century ago and ever since, many methods have been studied. Steiner (Diver, 2002) who introduced the concept of biodynamic farming to include composted materials applied in solid
form as soil amendments and in liquid form as compost extracts. The recent increase in sustainable and organic farming and problems relating to pesticide use has led to an increase in scientific papers and non-refereed publications relating to compost extracts and teas (Scheuerell and Mahaffee, 2002). The use of composted organic waste as fertilizer and soil amendment not only results in an economic benefit to the small-scale farmer but it also reduces pollution due to reduced nutrient run-off, and N leaching (Nyamangara et al., 2003).

Compost teas are fermented watery extracts of composted materials that are used for their beneficial effect on plants. Compost tea is a highly concentrated microbial solution produced by extracting beneficial microbes from vermi-compost and/or compost. It is a source of foliar and organic nutrients, contains chelated micronutrients for easy plant absorption and the nutrients for both plant and microbial uptake. The most widely described benefit of compost teas is their ability to decrease plant disease when used as soil drenches or foliar sprays (Scheuerell and Mahaffee, 2002). Compost teas are viewed as potential alternatives to the use of synthetic chemical fungicides as they provide a means of controlling plant pathogens that are deemed safer for health and the environment (Siddiqui et al., 2008). Although disease suppressive effects of compost teas have been reported in numerous agricultural systems, their efficacy remains variable (Scheuerell and Mahaffee, 2006). Many authors reported that teas prepared from manure-based composts are generally more effective against plant pathogens than teas from plant-based composts (Haggag and Saber, 2007). Conversely, others have concluded that the type of the compost does not directly affect the efficacy of the tea and that both manure-based composts and other compost types can provide an efficient tea to control plant pathogens (Scheuerell and Mahaffee, 2006).

III. Feedstock materials for composting

Uniform horticultural standards for composted products have been hard to establish because of the various raw materials that are being used. The quality and characteristic of the compost vary depending on composting feed materials which make it difficult to predict its application rates and subsequently need unending researches to evaluate their effects on soil nutrient content, soil conditioning properties, and parasites control before licensing for application. Virtually any organic substance is a potential source material of compost that may include municipal sewage sludge, food scraps and remnants, lawn and landscaping debris, or industrial byproducts. In many cases, two different types of feed materials may be combined to alter the chemistry of the decomposition process to produce a specific substance. Research has been conducted on numerous composts to evaluate their potential as substrates or substrate components in ornamental plant production such as biosolids (municipal) waste (Wilson et al., 2003), agro-industrial wastes (Garcia-Gomez et al., 2002), pruning wastes (Benito et al., 2005), coconut coir (Hernandez-Apaolaza et al., 2005), poultry wastes (Evans, 2004), yard trimmings (leaves and green wastes) (Chen et al., 2003), cork materials (Carmona et al., 2003), olive-mill waste (Papafotiou et al., 2004), polyester fleece (Schoeder and Foerster, 2001), seagrass (Orquin et al., 2001), paper mill wastes (Chong, 2003).

Several composts from vegetal material were assessed by many authors. Seagrass and seaweed residues were tested with yard waste for horticultural purposes by Orquin et al., (2001). More than one compost from animal material were also studied in the literature e.g., pig manure (Atiyeh et al., 2000), mink manure (Ferguson 2001), racetrack manure, (Warman & Termeer, 1996). Previous studies have found that amendment with farmyard manure (Toyota and Kuninaga, 2006), grape compost (Saison et al., 2006), Posidonia compost and spent mushroom compost (Pe’rez-Piqueres et al., 2006) significantly affected soil microbial community structure. However, the effects of compost were found to vary depending on both the type of compost and the soil type (Pe’rez-Piqueres et al., 2006). The effects of sewage sludge, turkey manure, and composted turkey manure were found to vary with the specific amendment and were transient (Calbrix et al., 2007). Recently, Ayyappan et al. (2013) observed that halophytic compost increased the growth and yield characteristics of Vigna radiata in salt affected agricultural land at coastal area.

Ravindran et al. (2007) observed that nutrient content in halophytes were higher when compared to green manures (glycophytes), while obtained from some species such as Crotalaria juncea, Sesbania aculeate, Cyamopsis tetragonoloba and Vigna catajung. From a technological, economical and/or environmental point of view, composting has been considered one of the best techniques to utilize the algal biomass (Cuomo et al. 1995). Seaweed composting, however, presents some problems that should be solved
before the resulting compost could be used as an amendment in horticulture, flower production, or forestry. In particular, high compost salinity and excessive sand content can seriously limit plant growth and development (Prasad et al. 2008). Composting of seaweed seems to be technologically feasible; besides solving an important environmental problem for seashore, it contributes also to improve the fertility of agricultural soils, which are poor in organic matter and nutrients.

IV. Production methods & Application technology

Numerous methods and technologies have been developed through the centuries for composting organic wastes. Windrow composting is one of the more popular methods using relatively little input. This is an open composting system where wastes are placed in rows and turned periodically, usually by mechanical equipment (Rodale, 1971). In addition to windrows, compost can also be generated in static piles, passively aerated windrows, forced aeration piles, enclosed or in-vessel composting, and in silo and reactor systems (Fitzpatrick, 2005). Composting is a predominantly thermophilic and aerobic process under controlled circumstances involving microbial breakdown and stabilization of organic materials from which the main products released are carbon dioxide, water, ammonia and heat. There are a number of factors of utmost importance for the composting process to succeed such as composition of raw materials, oxygen availability, moisture, pH and temperature (Eklind, 1998). Temperature is elevated during composting since organic material works as a self-insulating mass that retains heat generated due to microbial activity and heat might thus be regarded as a metabolic waste product. Decomposition rates decrease, temperatures decline, mesophilic microorganisms recolonize the compost and the humic fraction increases due to degradation of lignins and dead microorganisms (Oworu et al., 2010) (Figure 1).

![Figure 1. Changes in temperature and pH of the composting pile during compost](image)

Compost tea (CT) as an extract or leachate can be derived from composted plant or animal waste. Several methods for producing CT have been reported, with a primary difference among these methods being in the aeration provided during the brew period (Diver, 2002; Ingham, 2005). Mechanistically, two methods of producing compost tea are non-aerated and aerated extracts. Aerated CT (ACT) is produced with supplemental air, either through direct injection of air into the brew tank or through mechanical recirculation of the brew tank contents. Nonaerated CT (NCT), also called passively aerated CT, is produced without supplemental air by steeping ingredients in water either undisturbed or stirred occasionally throughout the brew period (Sheuerell and Mahaffee, 2006). Often, the compost contains adequate food for microbial growth but the addition of feed stock such as kelp, molasses, humic-fulvic acids and rock dust encourage high microbial populations (Grace, 2005). Another source of variation in producing CT is in the additives used. Because a primary goal of CT production is to increase the microbial populations in compost, many practitioners include additives to facilitate this increase by providing a nutrient source for microbes. Common additives are molasses, fish hydrolysate, rock dust, soluble kelp, and humic acid. Each of these additives putatively targets certain groups of microorganisms in the compost. Molasses, fish hydrolysate,
and kelp are thought to increase bacterial biomass, while rock dust and humic acids are reputed to increase fungal biomass (Ingham, 2005).

For control of plant pathogens the compost extract or “tea” can be applied and has been shown to be effective as a foliar spray (Scheuerell and Mahaffee, 2006) or as a soil drench application to the plant root zone or rhizosphere (Al-Mughrabi et al., 2008). Recent work by Ozores-Hampton et al. (2002) suggests that immature compost applied as surface mulch may be an effective alternative weed control method, whether applied alone or in combination with chemical herbicides. The difference between the use of soil-applied composts and watery compost extracts can perhaps best be summarized in that the teas give immediate but very short-term control of surface spreading pathogens, while soil composts act more slowly over a longer period of time and require much larger amounts. Where soil amendments and foliar sprays are being utilized there is an emergence of biodiversity at the root and leaf surface that has potential for exploitation against many common pests and pathogens known to inhibit vegetable productivity (Dufuor, 2001). The utility of compost tea as a plant production tool is further impacted by application parameters such as addition of spray adjuvants, and application rates and timing (Table 1).

**Table 1. Compost tea production and application parameters that influence compost tea properties and function.** [Adopted from Scherell and Mahaffee (2002)]

<table>
<thead>
<tr>
<th>Production Parameters</th>
<th>Application Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fermentation vessel</td>
<td>Dimensions, manufacturer and model if applicable</td>
</tr>
<tr>
<td>Compost</td>
<td>Feedstocks, age, stability, % moisture, available nutrients, microbial analysis, either volume and bulk density used or weight used per unit water</td>
</tr>
<tr>
<td>Water source</td>
<td>Volume, initial and final temperature</td>
</tr>
<tr>
<td>Nutrient additives</td>
<td>Types, concentrations, timing when added</td>
</tr>
<tr>
<td>Dissolved oxygen</td>
<td>Stirring, agitation, and/or aeration</td>
</tr>
<tr>
<td>Temperature</td>
<td>Water temperature at start and throughout production</td>
</tr>
<tr>
<td>Production duration</td>
<td>Method of storage, if not used immediately</td>
</tr>
<tr>
<td>Filtration</td>
<td>Material and mesh size used for filtering</td>
</tr>
<tr>
<td>Dilution ratio</td>
<td>Water source</td>
</tr>
<tr>
<td>Adjuvants</td>
<td>Nutrients, surfactants, stickers, UV stabilizers, microorganisms</td>
</tr>
<tr>
<td>Application equipment</td>
<td>Make, model, nozzle specifications, pressure</td>
</tr>
<tr>
<td>Application</td>
<td>Rate, time of day, weather, interval between applications</td>
</tr>
</tbody>
</table>

V. Compost Application on Soil health

5.1 Physico-chemical properties & Microbial dynamics

Many authors have already reported the benefits of organic amendments in improving physical, chemical and biological properties of soil that depending on the amount and composition. Although, these parameters change slowly and several years are necessary to obtain significant differences, biological and biochemical parameters are more sensitive and can provide earlier measurements of changes produced by soil management (Melero et al., 2007; Courtney and Mullen, 2008; Chitravadivu et al., 2009). Increasing soil organic matter has the added benefit of improving soil quality and thereby enhancing the long-term sustainability of agriculture (Laird et al., 2001). The use of composted organic waste as fertilizer and soil amendment not only results in an economic benefit to the small-scale farmer but it also reduces pollution due to reduced nutrient run-off, and N leaching (Nyamangara et al., 2003). The addition of municipal solid waste compost to agricultural soils has beneficial effects on crop development and yields by improving soil physical and biological properties (Zheljazkov and Warman, 2004).

Compost used to improve soil physical and biological properties i.e., water retention capacity, drainage, pH, better availability of soil micro-organism and reducing the negative impact of chemical based pesticides and fertilizers in the ecosystems. Compost tea also produced plant hormones, mineralize plant available nutrients, fixes nitrogen and providing useful microorganisms that colonize leaf surfaces (Zheljazkov and Warman, 2004). According to many authors compost applied to soil increases total pore volume, facilitates the penetration of water and increases soil water holding capacity (Jamroz and Drozd, 1999). Gabi et al.
(2008) reported that compost increased total porosity and enhanced the soil structure and quality of the pore system. Organic matter, including compost, has beneficial effects on soil structure and leads to enhancement of hydraulic properties, slows down crust formation, delays runoff and reduces erosion. Pant et al. (2011) reported that application of vermicompost teas did not affect pH, but significantly increased EC, N and K content of Pak Choi growth media. Hence, physical and chemical properties of nutrients in the compost tea could improve the nutritional status of the plants (Koné et al., 2010).

The effect of application of compost on the physical and chemical properties needs many years to provide any significant results, whereas, microbiological and biochemical properties are very responsive and provide immediate and precise information on small changes occurring in soil. In fact, they also indicate the soil’s potential to sustain microbiological activity (Odlare et al., 2008). Such increase of microbial population might be imputed to the availability of growth nutrients and the positive effect of organic matter on the physical properties of soil which support the microbial growth and activity in the soil. In agricultural soils, microorganisms are known to exert profound influences on the status of soil fertility, in particular on the availability of plant nutrients and sustaining the productivity of soils (Vineela et al., 2008).

Applying organic amendments has been shown to increase soil microbial activity, microbial diversity, and bacterial densities (Liu and Ristaino, 2003). Bacteria and fungi generally comprise >90% of the total soil microbial biomass, and they are responsible for the majority of soil organic matter decomposition. The ratio of fungal: bacterial biomass has been shown to be particularly sensitive to soil disturbance, with lower ratios associated with increased intensity of cultivation (Bailey et al., 2002) and increased N fertilization inputs (Frey et al., 2004). Substrate quality also alters fungal: bacterial ratios, with low quality substrates (high C/N) favoring fungi and high quality (low C/N) substrates favoring bacteria (Bossuyt et al., 2001). In soil, fungi, although numerically much less abundant than bacteria, can account for twice the weight of bacteria and actinomycetes combined (Vig et al., 2003). It has been documented that the addition of organic amendments increased the microbial biomass and resulted in a positive correlation between microbial biomass carbon and cfu values of microbial populations (Li et al., 2008; Vineela et al., 2008; Chitravadivu et al., 2009). Previous studies have found that amendment with farm-yard manure, grape compost, and spent mushroom compost significantly affected soil microbial community structure. However, the effects of compost were found to vary depending on both the type of compost and the soil type (Rashad et al., 2011).

5.2 Compost application on Crop productivity

The first trials of compost use to produce foodstuff crops in other developing countries have also provided encouraging results. In China and Japan for instance, compost was used to produce rice, wheat, maize, soybeans, cotton, sugar cane, groundnuts and the results gave very significant response of these crops to the newly applied compost input (Dalzell et al., 1987). In India, mineral fertilizer substitution by compost contributed to an increase in crop yields till 25% (FAO, 1978). Likewise, in Senegal, the use of compost at a dosage of 100 tonnes/ha has yielded to the multiplication of cabbage weight by four (Fritz, 1991). Olayeye et al., (2008) reported that application of excessive amendment to soil would merely encourage biological growth at the expense of economic yield. The results of a field surveys prove that, as compared to non-compost users, the yield of lettuce is 21.90% higher for compost users and the total profit gained is 55.95% higher for compost users meaning that, using compost for lettuce production could be economically advantageous for farmers. The higher lettuce yield or total profit gained by compost users could be explained by the good follow up of compost farms by Cameroonian agricultural technicians and mainly by the various agronomic benefits or sustainable effects of compost (slow-release store of nutrients, water holding, erosion protection, good soil structure and texture, plant diseases control, weeds reduction, etc) (Drechsel and Kunze, 2001).

Another survey in 2005 by Jaza Folefack (2008) indicates that, as compared to noncompost farms, the use of compost to produce the 11 main foodstuff crops and vegetables of the villages surrounding Yaoundé results in an increase in yield ranging between 4 to 42% depending on the crop type. This testifies that, compared to mineral fertilizer, the use of compost leads to higher crop yields. A remarkable yield increase of 26% and 23% was observed respectively in lettuce and maize produced using compost. A number of other studies pointed out, that application of compost increased the plant height in rice (Shanmugam and Veeraputhran, 2000), plant height in senna with farmyard manure (Ramamoorthy et al., 2003), number of
leaves in Piper betle with farmyard manure (Arulmozhian and Thamburaj, 1998), leaf area in maize with farmyard manure and phosphate solubilising bacteria (Nanjundappa et al., 2000), number of branches in fenugreek with farmyard manure (Khiriya and Singh, 2003), total number of root nodules in mungbean with organic manure (Gomaa and El-Kholas, 1999), fresh and dry weight of root nodules in soybean with sugar pressmud (Jain, 2003) and in green gram with vermicompost (Rajkhowa et al., 2003). Studies have shown that compost applications can improve growth and quality of many vegetable crops (Akanbi et al., 2007).

5.3 Compost mediated pathogenic resistance

Application of synthetic pesticides to control plant diseases is being restricted due to increased public concern related to the danger on human health, environment and appearance of resistant strains to synthetic chemical substances (Moretti et al., 2008). The use of resistant crop varieties had been the most effective means of managing the disease (Khaleed et al., 2007). However, occurrence of new pathogenic races of the pathogen has rendered the erstwhile resistant varieties susceptible, especially to race 3 of the pathogen (Amini, 2009). In view of these developments, the need for alternative methods of the disease management which are safe and eco-friendly has become an ongoing endeavor. Application of compost as soil amendments and foliar sprays resulted an emergence of biodiversity at the root and leaf surface that has potential for exploitation against many common pests and pathogens known to inhibit vegetable productivity.

With the acceptance of fungicides declining, attention is turning to alternative approaches for disease control (Schaeuerell and Mahaffee, 2002; Schouten, 2002). Several studies found that compost added to the growth medium of a plant may alter resistance of the plant to disease. Since high levels of resistance to bacterial spot, early blight, Septoria leaf spot, and anthracnose are not available in many vegetable crops, additional disease management strategies are needed to reduce economic losses caused by these diseases. Application of compost extracts (compost teas), which are filtrated solutions of mixtures of compost materials and water, showed promising results on crop protection after a soaking period referred to as “extraction time”. Also, organic fertilisers such as liquid pig manure, matured cattle manure and sugarcane husks applied directly to the soil showed promising results for control of some crop diseases. Compost tea (CT) has been cited as an option for conventional and organic growers to suppress plant pathogens (Diver, 2002; Ingham, 2005). Compost extracts have been used for topical sprays to control foliar disease (Zhang et al. 1998), such as grey mold caused by Botrytis cinerea on strawberries, late blight of potato caused by Phytophthora infestans (Elad et al. 1994), and apple scab caused by Venturia inaequalis. Attempts have also been made to manage plant diseases with compost extracts from animal and plant sources. McQuilken et al. (1994) and Yohalem et al. (1994) reported that compost extracts reduced the severity of foliar diseases such as powdery and downy mildews of grapes caused by Plasmopara viticola and Ulicinula necator respectively, gray mould of straw berries (Botrytis cinerea), and late blight of potato (Phytophthora infestans). Several plant diseases have been reported to be suppressed by the application of compost water-extracts. Reports include those of such diseases: apple collar rot, apple scab caused by Venturia conidia (Andrews and Harris, 1992), grey mold of tomato incited by Botrytis cinerea (Elad and Shtienberge 1994), downy mildew of grape caused by Plasmopara viticola (Weltzien and Ketterer, 1986), Fusarium wilt of peas caused by Fusarium oxysporum f. sp. phaseoli (Khalifa, 1965), damping off of cucumber caused by Pythium aphanidermatum (Boehm et al.,1993) and Rhizoctonia damping-off caused by Rhizoctonia solani in a bark compost-amended container medium (Hointink et al.,1991). Water extracts from spent mushroom composts have also been reported to be effective against apple scab incited by Venturia inequalis (Yohalem et al., 1994). Ma et al. (2001) reported a significant reduction in Fusarium wilt of sweet pepper (Fusarium oxysporum f. sp. vasinfectum) using extracts made from livestock manure compost.

5.4 Pathogen suppressive action of Compost

Several mechanisms involved in the antagonistic activity of beneficial microbes from compost tea including competition for nutrients, site exclusion, production of inhibitory metabolites, and parasitism (Elmer and Reglinski, 2006). Moreover, compost extracts have been shown to induce natural plant defenses against pathogens (Zhang et al., 1998).
Compost teas produced from composted organic material with recommended carbon to nitrogen ratios of 30:1 typically contain a diverse mixture of active micro-flora and fauna including bacteria, fungi, protozoa and nematodes. These beneficial organisms occupy spatial niches on the leaf surface and feed on leaf exudates that pathogenic organisms would otherwise feed on to prosper; other microbes directly interfere with pathogenic organisms through antagonism (Diver, 2002). Some studies indicated that plant growth promoting rhizobacteria (PGPR) found in compost was acted as inducers of systemic resistance in plants (Zhang et al. 1998). The effects of compost application either as extracts to the foliage or as soil amendments on plant disease control may be due to direct antifungal or resistance inducing/plant strengthening effects. Compost teas are reported to control plant pathogens through different mechanisms in tomato (Fig 2) (Kalaiselvi and Arumugam, 2014).

It was suggested that compost extracts contained biocontrol agents producing unidentified chemicals that played a role in inducing resistance of plant (De Brito-Alavaez et al., 1995; Cronin et al., 1996). The most reported factor influencing the efficacy of compost teas in inhibiting the development of plant disease is their microbial content. The microorganisms present in the tea may act as pathogen antagonists through their ability to compete for space and nutrients (Al-Mughrabi et al., 2008), to destroy pathogens by parasitism (El-Masry et al., 2002), to produce antimicrobial compounds, or to induce systemic resistance in plants (Zhang et al., 1998). The mechanisms of action exhibited by bio-control agents present in the compost extracts in suppressing soil-borne pathogens reportedly explained to include parasitism, production of antifungal compounds, competition for nutrients and colonization sites and also, through induction of systemic resistance in the plants (Kobayashi et al., 2005). Beneficial microorganisms in CT are thought to suppress plant diseases by occupying spatial niches on the phyllosphere, competing with pathogens for leaf/seed exudates, or directly antagonizing pathogens (Diver, 2002; Ingham, 2005). Other work hypothesized that the physicochemical properties of the compost teas, namely nutrients and organic molecules such as humic or phenolic compounds (Siddiqui et al., 2008), may protect the plant against disease through improved nutritional status, direct toxicity toward the pathogen or induced systemic resistance. Zhang et al. (1998) found compost extracts contained microflora that can induce resistance of cucumber to Colletotrichum orbiculare by increasing â-1,3 glucanase activity. Ingham (2005) reported that aerated compost tea often added sugars, grain, fish emulsion, kelp tea, humic acid and other materials is enhanced microbial activity of the final brewing product. The compost extracts were undoubtedly harbored significant populations of biocontrol agents because they were prepared from mature composts, which typically are colonized by a great diversity of such microorganisms (Bulluck and Ristaino, 2002).
VI. Conclusion

This review significantly explored that halophytic compost use leads to higher crop yields and profits, more productive and beneficial than mineral fertilizer, lower the crop’s irrigation requirements, and that both compost and animal manure provide organic matter beneficial to soil. Many research findings revealed that the use of compost tea for crop production is agronomically and economically advantageous for many small scale farmers in tropical countries. There are a myriad of possible factors that could contribute to the variability in the effectiveness of compost tea in the field including the raw materials used in the compost, the compost production process, the microbial food supplements used, compost tea application methods and timing, disease severity and environmental conditions. Composting of halophytes seems to be technologically feasible; besides solving an important environmental problem for our seashore, it improves the fertility of the agricultural soils, which are poor in organic matter and nutrients. In water-limited environments, the addition of compost to sandy loam soils used for intensive horticulture can be a good amendment that improves their physical and nutritional characteristics. Composting of halophytes is an important aspect in organic agriculture that merits further investigation.

References


