PRODUCE OF ORGANIC FERTILIZERS FROM AGRICULTURE WASTES: THE ACTIVITIES OF ORGANIC FERTILIZER PROJECT IN IRAQ

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ABSTRACT

The objective of the study is to describe activities related to composting of agriculture wastes conducted at sites of composting in six Governorates, Iraq in the period from 2008 to 2014.

The activity is part of ongoing national project funded by Ministry of Agriculture. The raw materials included wheat straw, date palm fronds, corn wastes, reeds and papyrus, weeds and vegetable wastes.

The main steps in aerobic composting organic materials were constructing a pile nearly 1.5 m high and 2.00 m wide; it can be as long as it is needed. The materials are divided in three layers placed alternatively with layer of activator containing soil suspension, sources of N and P, and animal manure. The pile is moistening to 50-60% water content (on dry basis) and turned every7 - 10 days to get air into it and maintain aerobic conditions for microorganisms. The water content and temperature is monitored periodically during the process of composting. The compost will be finished (mature stage) in nearly 8 weeks (50 -70 days) taking dark color with earthy smell. The mature compost was analyzed for chemical and physical characteristics. Most characteristics are close to the standard characteristics of compost used for soil amendment. The compost produced at those sites has been used in production of vegetables (tomatoes, cucumber, and eggplant) in plastic houses. Data on using compost derived from wheat straw indicated the beneficial effect of compost on soil properties (organic matter content and supplying of macronutrients) and crop yield. Composting of agriculture wastes can be part of recycling strategy of variety of wastes including solid municipal wastes which bring tremendous benefits to agriculture and the environment in long run.

INTRODUCTION

The term composting refers to the decomposition of organic matter by microorganisms into a stable, humus-like product material that is dark brown or black and has an earthy smell (27). The process depends upon microorganisms (mainly bacteria ,fungi and actinomysetes) which utilize decomposable organic both as an energy and nutrient source. Composting is the breakdown of any organic material (ingredients) into a crumbly, dark, soil-like product in which none of the original material can be easily identified (13).

Organic waste materials include, animal manures, yard waste, crop residues, municipal solid waste, fish scraps and mortality, food waste, and food process wastes can be used to produce compost. Compost has many uses on the farm. It can be used as a soil amendment to improve soil structure, infiltration rate, water holding capacity, and tilth. It will increase soil microorganism populations, soil organic matter and humus. Compost can also be used as a fertilizer supplement for nitrogen, phosphorous, potassium, and trace elements (20).

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The recycling of compost to land is considered as a way of maintaining or restoring the quality of soils, mainly because of the fertilizing or improving properties of the organic matter contained in them. Furthermore, it may contribute to the carbon sequestration, and may partially replace peat and fertilizers (23). Compost land application completes a circle whereby nutrients and organic matter which have been removed in the harvested produce are replaced (7). Composting helps to optimize nutrient management and the land application of compost may contribute to combat soil organic matter decline and soil erosion (28).

Composting relies on a natural process that results from the decomposition of organic matter by microorganisms. The process occurs in two major phases. In the first stage, microorganisms decompose the composting feedstock into simpler compounds, producing heat as a result of their metabolic activities. The size of the composting pile is reduced during this stage. In the second stage, the compost product is "cured" or finished (25). The microorganisms necessary for composting are naturally present in most organic materials, including leaves, grass clippings, animal manure, and other organic materials. Products are available that claim to speed the composting process through the introduction of selected strains of bacteria, but tests have shown that inoculating compost piles in this manner is not necessary for effective composting of typical yard trimmings or municipal sewage waste feedstock (21). Although microorganisms play a major role in the composting process, other organisms such as rotifers, mites, springtails, sow bugs, beetles, and earthworms also play a role (1) in organic matter decomposition. They reduce the size of the composting feedstock by foraging, moving in the compost pile, or chewing the composting materials. These actions physically break down the materials, creating greater surface area and sites for microbial action to occur.

The composting process may begin as soon as biodegradable waste is piled together. A structure and turning allowing oxygen diffusion through the pile and moisture content suitable to support the metabolic processes of the microorganisms are necessary (14). The oxidative metabolism of microorganisms is exothermic, and the heat produced is sufficient to increase the temperature of organic matter to between 60 and 75°C over a period of up to 10 days. This so-called "thermophilic stage" offers a self-sanitizing mechanism by which pathogens, seeds and heat-labile microbial and plant toxins (phytotoxins) will be destroyed (15). Not all organic matter will be degraded completely. For example, lignin in plant material will be modified and become part of the final stable product. These modification processes are slow and occur during the maturation stage.

Various organic waste materials produced by farming such as wheat straw, corn wastes, husk, date palm wastes, vegetable wastes, animal manure, and many others are available in the country and can be used to produce compost. No official reports about the quantity produced are found. However, huge amounts are produced seasonally and burning is the tradition way of disposing most of these wastes. The present investigation is focused on establishing methodology for compost production from several types of farm wastes that can be disseminated among farmers for adaptation. It is part of on-going national project to practice agriculture and animal waste recycling through bioremediation measures and makes use of the product to improve soil health and land productivity for future agriculture.

MATERIAL AND METHOD

Production of compost in Iraq gains importance given the fact that protective agriculture for vegetables is expanding. With low land productivity due to low soil organic matter, depleted plant nutrients, and many other factors, there is a necessity to improve management practices of such lands through using compost in sustainable agriculture. Composting programs can be designed to handle resources available at Provinces. For instance, date palm wastes are available at Basra and Karbala, wheat straw at Wasit, and reeds and papyrus at Meesan. Composting can be done on a large or small scale, with the management requirements and intensity increasing as composting size increases. Composting of agriculture wastes can be part of recycling strategy of variety of wastes which bring tremendous benefits to agriculture and the environment in long run.

Sites of compost production and types of agricultural wastes

Six Iraqi Provinces were involved in "Phase 1" of a National Project on "Organic Farming" for the period 2008-2012. These are Baghdad, Karbala, Najaf, Wasit, Meesan, and TheQar. The second phase (Phase 2) included the Governorates of Nineveh, Kirkouk, Diyalah, Muthana, and Basra for the period 2013-2017. Ministry of Agriculture supported the project and provided the required funds to established sites for composting of agriculture wastes. The sites were supplied with many facilities including metal sheds with concrete base of nearly 1200 m² for composting. The design sites are capable of handling several tons of composting materials at the same time.

For Phase 1 of the project, the six Governorates involved in composting variety of agriculture wastes. Table 1 illustrates the different types of waste available at those Governorates either at low price or as wild plants.

Table 1:Provinces of Baghdad, Karbala, Najaf, Wasit, Meesan, and TheQar, Iraq and the agriculture wastes used for composting.(***In these sites, the compost is manufactured from all the residues, but it is based on a specific type)***

Governorates	Agriculture Wastes
Baghdad	Variety of wastes
Karbala	Date palm
Najaf	Rice straw and husks
Wasit	Wheat straw and corn waste
Meesan	Reeds and papyrus
TheQar	Weeds and vegetable wastes

Composting Methodology

Extensive literature is available on composting of organic wastes including crops residue, vegetables wastes, yard trimming, agricultural industrial wastes, biosolid wastes, animal wastes, etc. (13, 15, 21, 27) (However, all composting methods share similar characteristic features and processes. A successful composting should follow basic steps and understanding of the fundamentals including the providing of the proper environmental conditions for microbial activity.

In the present study, we will explain the steps in composting one ton (1000 kg) of Agricultural waste. Composting of different materials is in general the

same with minor differences related to the adjustment of C/N ratio in the composted materials. We choose a pile system or binless compost pile for composting. A bin system has been used in some sites.

Main steps in aerobic composting one ton of wheat straw in pile system are as followed (This method was devised according to the practical experience of the project):

1- Choosing of a concrete area 2 x 3 m²sufficient for pile (or heap) and supplied with source of water and surface drain and collector for the leachate.

2- The material is mechanically shredded into 3-5 cm using a grinder machine to increase its specific surface area for enhancing biological activities. The material then is divided into three portions in three layers. Water is added to each layer and firmed each layer as it is added, but do not compact it so much that air can"t move freely through it.

3- An activator containing agriculture soil (2.5%) (Suspension), source of N (Urea2%) and P (DAP1%), and animal manure (5%) is then mixed and placed alternatively with the layers of materials. According to our experiences, 25 kg of soil is sufficient to supply the materials with adequate source of microorganisms for decomposition of the raw materials; normally the animal manure contains microbes responsible for decomposition. The activator contains also 20 kg N and 10 kg P for adjusting the C/N ratio of the materials and supplying P. This condition is required for maintaining proper environment for microbial activity.

4- The materials are placed alternatively with the activator in three layers to construct a pile nearly 1.5 m high and 2.00 m wide. It can be as long as it is needed. A pile this size has plenty of mass in which microbes can live, yet is also large enough that the center of the pile is well-insulated by the material surrounding it. Smaller piles just cannot insulate themselves well enough to remain hot for long for the duration of composting.

5- The pile is moistening to 50-60% water content on dry basis. Figure 1 shows piles of the materials at Najaf site at the beginning of composting process. One ton of materials required nearly 800 L of water. Ideally, the pile should be as moist as a wrung-out sponge to fit the needs of compost microbes. It should be obviously moist to touch, but yield no liquid when squeezed. At this moisture level, there is a thin film of water coating every particle in the pile, making it very easy for microbes to live and disperse themselves throughout the pile.

6- The pile is turned every 10 days to get air into it, which means completely breaking it apart with a garden fork and then piling it back together in a more „fluffed-up" condition.

When turning the pile, ensure the materials from the outside of the pile are placed on the inside. Turning of pile is essential practice to maintain aerobic conditions throughout the composting process. It promotes uniform decomposition of composting materials as cooler outer layers of the compost pile are moved to inner layers where they are exposed to higher temperatures and more intensive microbial activity.

7- During the process of composting, water content and temperature are monitored periodically. This is done by taking several samples from different parts of the pile for water content at laboratory. Also, the "squeeze test" can be used for this purpose. It is a simple method of determining whether the moisture content falls within the proper range. If just a few

drops of water are released from a handful of the feedstock when squeezed, the moisture content is acceptable. Temperature is measured using soil thermometer. These factors are interrelated and they are monitored and should be controlled.

8- Good quality compost should take about 8 weeks (50 to 60 days). Finished compost is dark in color and has an earthy smell (like the smell of soil). The compost will be finished when the pile cools off and decreases to about one-third of its original volume (depending on the original ingredients). Usually, it"s difficult to recognize any of the original ingredients at this stage. Figure 2 illustrates photo of finished compost at Najaf site. Ingredients input into compost pile and the product finished compost during the composting process are explained in Figure 3.

Fig.1. Pile of wheat straw ready for composting at Najaf site, Iraq.

Characterization of compost

Samples from finished compost of different varieties of agriculture wastes were analyzed for pH, electrical conductivity (EC), organic carbon, total N, total P, total K, Ca, Mg, Na, Fe, Zn, Mn, and Cu using standard procedures(4, 5) Organic carbon was determined by Walkley-Black method.

Fig. 2. Finished compost derived from wheat straw at Wasit site, Iraq.

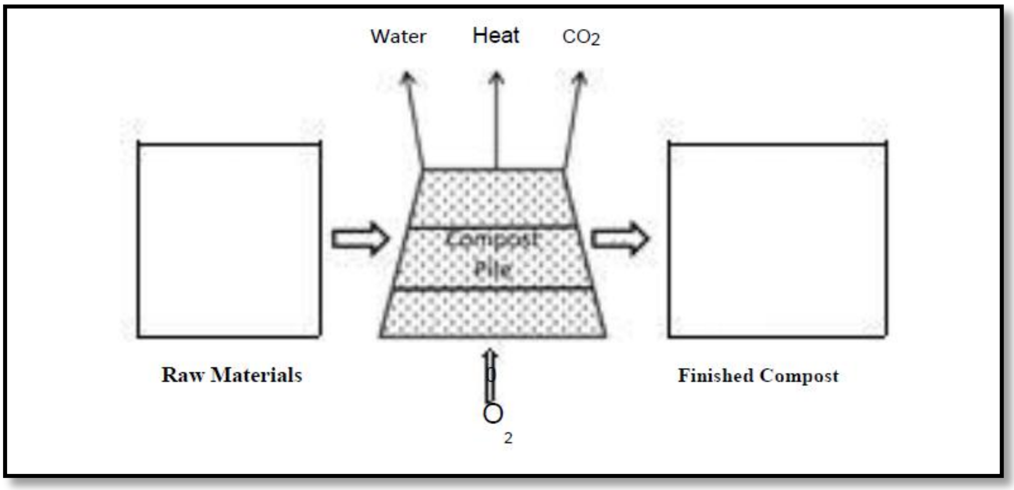

Fig 3: the composting process

Exchangeable K was extracted using ammonium acetate and determined on flame photometer. Micro nutrients (Mn, Cu, Zn, and Fe) were determined using Atomic Absorption.

RESULTS AND DISCUSSION

Composting processes

Composting is a succession of microbial activities whereby the environment created by one group of microorganisms invites the activity of successor groups. Different types of microorganisms are therefore active at different times in the composting pile. Bacteria have the most significant effect on the decomposition process, and are the first to take hold in the composting pile, processing readily decomposable nutrients (primarily proteins, carbohydrates, and sugars) faster than any other type of microorganism. Fungi, which compete with bacteria for nutrient, play an important role later in the process as the pile dries, since fungi can tolerate low-moisture environments better than bacteria (22). Figure 4 illustrates the input and output materials in composting processes. Any type of organic waste contains in general carbohydrate, protein and minerals. Decomposition of these materials by microorganisms in the presence of oxygen (aerobic conditions) will produce compost containing organic acids (humic and fulvic) and minerals. The composting process can be divided into two main periods: (i) active composting and (ii) curing. Active composting is the period of vigorous microbial activity during which readily degradable material is decomposed as well as some of the more decay-resistant material, such as cellulose. Curing follows active composting and is characterized by a lower level of microbial activity and the further decomposition of the products of the active composting stage. When curing has reached its final stage, the compost is said to be stabilized (16).

Temperature is a critical factor in determining the rate of decomposition that takes place in a composting pile. Initially high microbial activity and heat production cause temperatures within the compostable material to rise rapidly into the thermophilic range (50o C and higher). This temperature range is maintained by periodic turning or the use of controlled air flow (30). After the rapidly degradable components are consumed, temperatures gradually fall during the "curing" stage. At the end of this stage, the material is no longer self-heating, and the finished compost is ready for use (26). Composting temperatures largely depend on how the heat generated by the microorganisms is offset by the heat lost through controlled aeration, surface cooling, and moisture losses. The most effective composting temperatures are between 45 and 59°C (19). Substantial changes occur in microbial populations and species abundance during the various temperature stages (10). Mesophilic bacteria and fungi are dominant in the initial warming period, thermophilic bacteria (especially actinomycetes) during the high temperature phase, and mesophilic bacteria and fungi during the curing phase (8). A lack of heating indicates that aerobic decomposition is not established. This is caused by any number of factors, such as lack of aeration, inadequate carbon or nitrogen source, low moisture, or low pH. Poor aeration is caused by inadequate porosity that, in turn, can result from the characteristics of the material or excessive moisture (24).

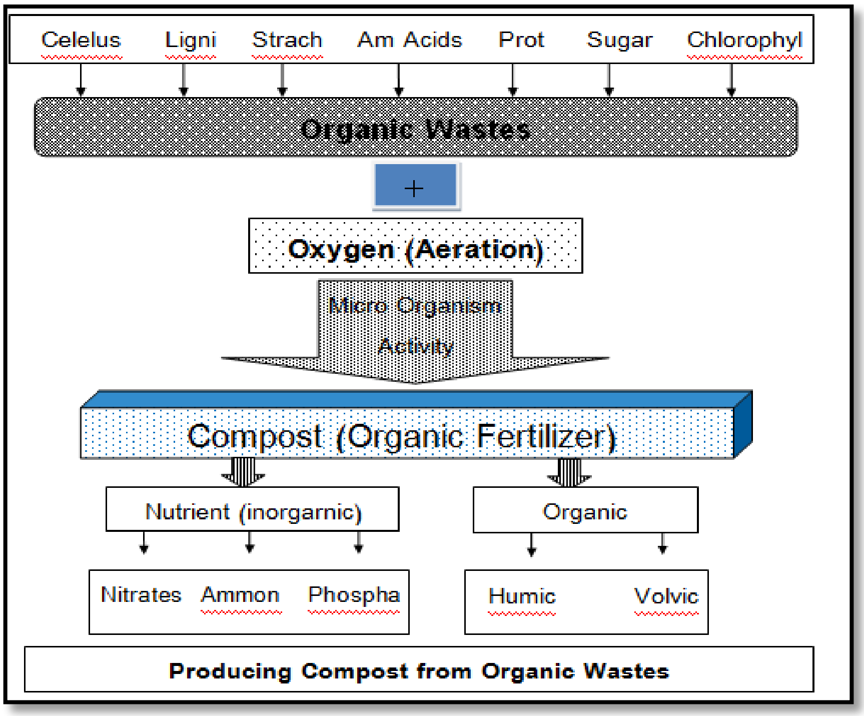

Fig. 4. Producing of compost from organic waste by microorganism in the presence of oxygen (aeration).

As long as the compost pile is of sufficient size to insulate internal layers from ambient temperatures and no artificial aeration or turning occurs, most of the heat generated by the microorganisms will be trapped inside the pile. In the insulated center layers, temperatures of the composting mass will eventually raise above the tolerance levels of the mesophilic organisms (27). When the temperatures reach toward 45°C, mesophiles die or become dormant, waiting for conditions to reverse. At this time, thermophilic microorganisms (those that prefer temperatures between 45 and 70oC become active,) consuming the materials readily available to them, multiplying rapidly, and replacing the

mesophiles in most sections of the composting pile. Thermophiles generate even greater quantities of heat than mesophiles, and the temperatures reached during this time are hot enough to kill most pathogens and weed seeds (26).

For composting to proceed efficiently, microorganisms require specific nutrients in an available form, adequate concentration, and proper ratio. The essential macronutrients needed by microorganisms in relatively large amounts include carbon (C), nitrogen (N), phosphorus (P), and potassium (K). Microorganisms require C as an energy source. They also need C and N to synthesize proteins, build cells, and reproduce. P and K are also essential for cell reproduction and metabolism. In a composting system, either C or N is usually the limiting factor for efficient decomposition (19). The C:N ratio is a common indicator of the availability of compounds for microbial use. The measure is related to the proportion of carbon and nitrogen in the microorganisms themselves. High C:N ratios (i.e., high C and low N levels) inhibit the growth of microorganisms that degrade compost feed-stock. Low C:N ratios (i.e., low C and high N levels) initially accelerate microbial growth and decomposition. With this acceleration, however, available oxygen is rapidly depleted and anaerobic, foul-smelling conditions result if the pile is not aerated properly (11).

Mature compost characteristics

Characteristics of mature compost produced from several types of agriculture wastes are given in Table 2. Standard characteristics of mature compost are also given. In general, most of the chemical characteristics, EC, pH, C, N, C/N, and macro and micro nutrients agree well with the standard characteristics. Nutrients and organic matter contents of composts have been studied extensively (9, 11). The ratio of the carbon to nitrogen (C/N ratio) is a key indicator of the compost"s suitability as a growth medium. In the present study, the C/N ratio ranged between 18 to 20. It is close to the standard characteristics and is on the upper range of a good compost of 20 (6).

Table2. Characteristics of matured compost from several types of agriculture wastes produced at composting sites, Iraq and the standard characteristics.

Character	Type of Agriculture Wastes					Standard Characteristic
	Wheat straw	Date Palm	Rice Straw	Papyrus Straw	Weed Straw	
EC (dS/m)	2.40	2.66	2.58	2.50	2.64	< 4
pH	7.07	7.04	7.14	7.05	7.05	6.5-7.5
C%	47.4	43.7	44.6	58.4	43.1	45-50
N%	2.61	2.30	2.48	2.62	2.32	2.0-2.5
C/N	18.1	19.0	18.0	22.3	18.6	25-35
P%	0.62	0.65	0.54	0.77	0.64	0.6-0.8
K%	1.03	2.80	2.60	2.41	2.78	1.5-2.0
Ca%	1.92	2.93	1.30	2.80	2.84	2.0-2.5
Mg%	0.71	0.580	0.380	0.610	0.550	0.7-0.8
Na%	0.48	0.622	0.430	0.680	0.640	0.450
Fe%	0.523	0.423	0.259	0.131	0.394	0.742
Zn%	0.075	0.055	0.031	0.033	0.052	0.022
Mn%	0.011	0.013	0.011	0.006	0.013	0.036
Cu%	0.006	0.005	0.003	0.004	0.005	0.008
Bulk Density (kg/ton	640	647	645	640	640	≤ 650
Particle Size(mm)	5-15	5-15	5-15	5-15	5-15	5-15

+ Compost for soil amendment.

Table 3 presents statistical parameters (mean, max, min, and standard dev.) of the compost produced from five types of agriculture wastes. For most macronutrients (N, P, K, and Ca) and micronutrients (Fe, Zn, Mn, and Cu), the means is close to the standard values. Further, the range values (max-min) are not wide indicating the suitability of the produced compost for crop and associated micro flora and fauna (bacteria and fungi). The differences are mainly attributed to the varied input materials particularly the C/N ratio. The chemical and physical stability of the compost determines the shelf-life and applicability of compost for various uses (17). Stable compost is one that shows an advanced degree of organic matter decomposition with resistance to further decomposition (29).

Table 3. Statistical parameters of some chemical and physical characteristic of the compost produced from different types of agriculture wastes (wheat Straw, date palm, rice straw, papyrus, and weeds).

Character	Statistical Parameters				Standard+ Characteristics
	mean	max	min	Stand. dev.	
EC (dS/m)	2.56	2.66	2.4	0.096	< 4
pH	7.07	7.14	7.04	0.036	6.5-7.5
C%	47.44	58.4	43.10	5.675	45
N%	2.47	2.62	2.30	0.137	2.0
C/N	19.22	22.3	18.1	1.577	25
P%	0.643	0.77	0.54	0.074	0.6-0.8
K%	2.32	2.8	1.03	0.662	1.5
Ca%	2.36	2.93	1.30	0.643	2.0
Mg%	0.57	0.71	0.38	0.107	0.7-0.8
Na%	0.57	0.68	0.43	0.097	0.450
Fe%	0.346	0.523	0.131	0.137	0.742
Zn%	0.0492	0.075	0.031	0.016	0.022
Mn%	0.0108	0.013	0.006	0.003	0.036
Cu%	0.0046	0.006	0.003	0.001	0.008
Bulk Density Kg/m3	642.4	647	640	3.007	≤ 650

+ Compost for soil amendment.

Use and application of compost for vegetables production

Compost has been demonstrated to benefit the biological, chemical, and physical properties of soil and improve crop yields. Vegetable production is one of the potential areas for compost use. Compost is attractive option to the horticultural because it is a source of organic matter and plant nutrients, increases the water-holding capacity of soil, improves the structure of soil, and enhances a soil‟s ability to suppress plant diseases. Besides, the varied qualities and characteristics of the finished compost make it difficult to suggest application rates. Compost derived from many sources of agriculture wastes in Governorates of Iraq has been used to investigate the application rates of compost in production of tomatoes, cucumber, and eggplant grown in plastic houses. For instance, compost derived from wheat straw at Wasit site, Iraq has been used in producing tomatoes in plastic house (49 m x 8 m) (3). The compost was applied in conjunction with mineral fertilizer and vermicompost (compost produced by worms). Five treatments were constructed in this experiment. They were full recommended chemical fertilizer (RCF), 10 ton compost/ha + ½ RCF,

20 ton compost/ha + ¼ RCF, 30 ton compost/ha, and 2.5 ton vermicompost/ha. Results indicated that no significant differences were found among the yield means. However, the highest yield (186.3 kg/plot) was obtained for the 20 ton/ha + ¼ RCF and the lowest (162.7 kg/plot) for vermicompost. Generally, replacement of chemical fertilizer with varied rate of compost or vermicompost produced beneficial effects on plant growth parameters and yield. Levels of macro nutrients (N, P, and K) during season and post-harvest remained high in treatments received compost indicating the gradual dissipation of nutrients from compost. In this respect, Rynk et al. (21) showed that when applied compost continuously; the supply of plant nutrients from compost is enough to keep plants healthy for several years.

The second study involved using compost and organic liquid fertilizer (OLF) (water extractable of mature compost) applied through foliar and drip irrigation in producing tomatoes (2). The experiment was conducted in multi-span plastic house (36 x 27.6 m2) located at the Experimental Farm of the Extension Department, Ministry of Agriculture, Kut, Wasit Governorate, Iraq for the season 2012/2013. Results indicated that both the 20 and 40 ton compost/ha was sufficient in improving soil characteristics and enhancing plant growth. The two methods of supplying nutrients to crop (fertigation or foliar application) were very close in effect on tomato yield. Even though the foliar application was associated with the use of low N dose OLF, it produced comparable yield to that produced by the fertigation associated with the use of high N dose OLF. Analysis of total macro nutrients N, P, and K in soil as well as the mineral forms of N (NH4 and NO3) indicated no significant differences were found among the treatments during the growing season at mid-season and post-harvest. These results suggest that the 20 ton compost/ha was sufficient to supply N, P, and K for plant growth and development and to maintain appreciable concentrations throughout the growing season. Soil organic matter had been increased with the growing season. Therefore, it is evident that the application of compost supplemented by organic liquid fertilizer was successful practice to meet crop demand for nutrients and maximize crop yield.

Conclusions

1. Composting of agriculture wastes at the six sites of Iraqi Governorates has been successful technology and can be adapted by farmers. Farms generally produce suitable amounts and types of wastes for composting will benefit from the application of compost to the soil and crop production.
2. Composting serves its important function as a firm of recycling.
It will open the door for recycling of municipal solid wastes, agricultural industrial wastes, and other types of wastes.

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انتاج الأسمدة العضوية من المخلفات الزراعية: نشاطات مشروع الأسمدة العضوية في العراق

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الملخص

الهدف من هذه الدراسة هو لوصف الأنشطة الخاصة بإنتاج السماد العضوي من المخلفات الزراعية التي أجريت في مواقع انتاج السماد العضوي في ست محافظات منا لعراق للمدة من 2008–2014 .

يعد هذا النشاط جزءاً من مشروع وطني مستمر بتمويل من وزارة الزراعة. وتضمنت المواد الخام مخلفات الحنطة، وسعف النخيل، ومخلفات الذرة والقصب والبردي والأعشاب والمخلفات النباتية. الخطوات الأساسية في عمل الكومة للتخمير الهوائي وبناء كومة ما يقارب من 1.5 متر ارتفاع و 2.00 م عرض. وتقسم المواد الى ثلاث طبقات نضع طبقة من المواد المنشطة التي تحتوي على معلق التربة ومصدري N و P، ومخلفات الحيوانات. ترطب الكومة بالماء الى ما يقارب 50–60٪ (على أساس الوزن جاف) وتقلب كل 10 أيام للحصول على التهوية المطلوبة والحفاظ على الظروف الهوائية للكائنات الحية الدقيقة. يتم مراقبة محتوى الرطوبة ودرجة الحرارة بشكل دوري أثناء عملية تصنيع الكومبوست. يكون الانتهاء من تصنيع السماد (مرحلة النضج) الى ما يقارب من 8 أسابيع (50 –70 يوماً) يكون اللون داكناً مع رائحة تشبه رائحة التراب. تتم تحليل الخصائص الكيميائية والفيزيائية للسماد الناضج. معظم الخصائص قريبة من الخصائص القياسية للأسمدة المستخدمة لتحسين التربة. وقد استخدم السماد المنتج في تلك المواقع في إنتاج الخضراوات (الطماطم، والخيار، والباذنجان) في البيوت البلاستيكية. وأشارت البيانات على استخدام السماد المنتج من مخلفات الحنطة الأثر الإيجابي في خصائص التربة (محتوى المادة العضوية وتجهيز المواد الغذائية الرئيسة) والمحصول. يمكن السماد العضوي المنتج من المخلفات الزراعية أن يكون جزءاً من استراتيجية إعادة التدوير من مجموعة متنوعة من المخلفات بما في ذلك المخلفات البلدية الصلبة التي تجلب فوائداً هائلة للزراعة والبيئة في المدى الطويل.

دائرة وقاية المزروعات، وزارة الزراعة، بغداد، العراق.