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Efficiency of *Trichoderma* spp. from Carabao Manure as Compost Activator and Utilization of Organic Fertilizer Produced in Pechay and Lettuce Production

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Abstract *Trichoderma* spp. are naturally occurring fungus with ability to enhance decomposition. Efficiency of *Trichoderma* spp. as compost activator was evaluated using the following: T1-rice straw (RS) + carabao manure (CM); T2–RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling; T3–RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first turning (1 kg); T4–RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning; T5-RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 1 kg T*richoderma* spp. applied during piling and 1 kg during first and second turning + actinomycetes on the last turning; T6- RS (75%) + ipil-ipil leaves (25%) + CM + commercial compost activator.
In the first experiment, the compost pile applied with *Trichoderma* spp. regardless of frequency of application did not differ on the number of days to harvest (74), while the control took 102 days to harvest. Percent recovery was high on Treatment 2 at 65.0%. The composite nutrient content of the compost has 34.17% organic matter; 2.67% nitrogen; 0.45% phosphorus; and 0.82% potassium.
To improve the nutrient content of the compost, another experiment was set-up with increased percentage (30%) of greens composed of ipil-ipil leaves, kakawate and banana bracts. Treatment 2 again recorded the highest percent recovery (63.34%), with days to harvest at 69. Treatment 5 has the highest NPK content of 5.3% with similar 69 days decomposition period.
Increasing the rate of *Trichoderma* spp. was also evaluated and results showed shortened days to harvest at 66, with split application (during piling, and first and second turning) of 6 kg *Trichoderma* per ton of compost pile. Pechay and lettuce applied with the produced organic fertilizer from T5, significantly obtained higher yield (9.04t/ha and 5.24 t/ha, respectively), compared to plants applied with commercial organic fertilizer.

Keywords: *Trichoderma* spp., compost activator, organic fertilizer, decomposition period, percent recovery

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Introduction

The potential of composting to turn on-farm waste materials into a farm resource makes it an attractive proposition. Composting offers several benefits such as enhanced soil fertility and soil health, thereby contributing to increased agricultural productivity, improved soil biodiversity, reduced ecological risks and a sound environment. While traditional composting procedures take as long as 4-8 months to produce compost, rapid composting methods using fungus to hasten decomposition period offer possibilities of reducing the processing period up to three months, which is a great advantage over the conventional method of composting.

Trichoderma spp. is a type of fungus that can be isolated from animal manure (Aganon, *et al*., 2008; Lopez, *et al*., 2014). It is very easy to grow and can be mass produced under laboratory condition. Aside from being a bio-control agent against other organisms, *Trichoderma spp.* also helps as a decomposer for biodegradable materials. As such, the effectiveness of *Trichoderma spp*. as decomposer and the quality of organic fertilizer produced from this experiment is the subject of this research.

Objectives: The study was conducted to determine the efficiency of *Trichoderma spp*. as decomposer for biodegradable materials. Specifically, the study aims to: a) establish the amount of *Trichoderma spp*. to hasten decomposition period; b) determine the quality of organic fertilizer applied with *Trichoderma spp*.; and c) evaluate the efficacy of organic fertilizer produced in pechay and lettuce production.

Materials and method

Experimental set-up in the Use of Trichoderma spp. Isolated from Carabao Manure as Compost Activator

Experiment in determining the efficacy of *Trichoderma spp*. isolated from carabao manure as compost activator was established using the different treatments with the ratio of 3:1:1. The following treatments were evaluated:

T1– rice straw + carabao manure

T2– rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 2 kg *Trichoderma spp.* applied during piling

T3–RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first turning (1 kg)

T4–RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning

T5-RS (75%) + ipil-ipil leaves (25%) + CM + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning + actinomycetes on the last turning

T6-rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + commercial compost activator

Collection of biodegradable wastes such as leaf litters, rice straw, carabao manure, green leaves (ipil-ipil), carbonized rice hull were done before piling of the different compost treatments. The ratio and proportion of each material were indicated in the treatments. The amount of *Trichoderma* spp. was added based on the scheduled application at 2 kg per ton of compost.

The compost piles with the size of 1m width x 2m length x 2m height were established at the RM-CARES Material Recovery Facility. The set-up was monitored from the start to maturity of each pile. Days of composting period was recorded and the quality of the compost was also determined.

Compost piles were turned or mixed every two weeks to make sure that the compost materials and the *Trichoderma* spp. were well distributed and to check whether the compost pile still have enough moisture to undergo faster decomposition. Turning was done every two weeks until the compost pile were fully decomposed and ready for harvesting.

Harvesting of the compost was done when the materials were no longer recognizable, with stable temperature and the compost becomes dark in color.

Experimental Design

The experiment was laid out following the Randomized Complete Block Design (RCBD) with three replications for each treatment.

Data Gathered

The data gathered were days to maturity/harvest, temperature, percent recovery and nutrient content of compost in terms nitrogen, potassium and phosphorous (NPK).

Data Analysis

Data gathered were analyzed using Randomized Complete Block Design (RCBD). Comparison among means was done using Duncan's Multiple Range Test (DMRT).

Experimental Set-up Re Application of Trichoderma spp. with Additional Greens in the Raw Materials

To increase nutrient content of the produced organic fertilizer particularly NPK, the following treatment combinations, zeroing on the addition of kakawate leaves and banana bracts apart from ipil-ipil and increasing the ratio at 30%, were established and evaluated:

T1- rice straw+carabao manure;

T2- rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling;

T3-rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first turning (1 kg) of compost pile;

T4-rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile;

T5-rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%)+ carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile + actinomycetes on the last turning of pile;

T6-rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure +commercial compost activator.

Collection of biodegradable wastes needed for the establishment of the expereimental set-up such as leaf litters, rice straw, carabao manure, green leaves (ipil-ipil, kakawate, banana bracks), carbonized rice hull were done before piling of the different compost treatments. The ratio and proportion of each material were indicated in the treatments. The recommended amount of *Trichoderma* spp. per ton of biodegradable wastes was added based on the scheduled application.

The compost piles with the size of 1m width x 2m length x 2m height were established at the RM-CARES Material Recovery Facility. The set-up was monitored from the start to maturity of each pile. Days to harvest were recorded and the quality of the compost was also determined.

Compost piles were turned or mixed every two weeks to make sure that the compost materials and the *Trichoderma* spp. were well distributed and to check whether the compost pile still have enough moisture to undergo faster

decomposition. Turning was done every two weeks until the compost pile was fully decomposed and ready for harvesting.

Harvesting of the compost was done when the materials were no longer recognizable, with stable temperature and the compost becomes dark in color.

Experimental Design

The experiment was laid out following the Randomized Complete Block Design (RCBD) with three replications for each treatment.

Data Gathered

The data gathered were days to maturity/harvest, percent recovery and nutrient content of compost in terms nitrogen, potassium and phosphorous (NPK).

Data Analysis

Data gathered were analyzed using Randomized Complete Block Design (RCBD). Comparison among means was done using Duncan's Multiple Range Test (DMRT).

Re-evaluation of Best Treatment with Increasing Rate of Trichoderma spp.

Based from the result of the second experiment (B), the best treatment in terms of NPK analysis was recorded from rice straw (70%) + ipil-ipil leaves + kakawate + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. applied during piling (1 kg) and during first and second turning (1 kg) of compost pile + actinomycetes on the last turning of pile (T5) and it also obtained the shortest number of days to harvest, although percent recovery was not the highest. With this, Treatment 5 was selected among the six other treatments to be re-evaluated using an increasing rate of *Trichoderma* spp. The following treatments were established:

T1= rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first and second turning (1 kg) of compost pile + actinomycetes on the last turning of pile;

T2= rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 4 kg *Trichoderma* spp. per ton of compost pile applied during piling (2 kg) and during first and second turning (2 kg) of compost pile + actinomycetes on the last turning of pile;

T3= rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure + CRH + 6 kg *Trichoderma* spp. per ton of compost pile applied during piling (3 kg) and during first and second turning (3 kg) of compost pile + actinomycetes on the last turning of pile.

The compost piles with the size of 1m width x 1m length x 2m height were established at the RM-CARES Material Recovery Facility. The set up was monitored from the start to maturity of each pile. Days to harvest were recorded and the quality of the compost was also determined.

Compost pile were turned or mixed every two weeks to make sure that the compost materials and the *Trichoderma* spp. were well distributed and to check whether the compost pile still have enough moisture to undergo faster decomposition. Turning was done every two weeks until the compost pile is fully decomposed and ready for harvesting.

Harvesting of the compost was done when the materials were no longer recognizable, with stable temperature and the compost becomes dark in color.

Experimental Design

The experiment was laid out following the Randomized Complete Block Design (RCBD) with three replications for each treatments.

Data Gathered

The data gathered were days to maturity/harvest, percent recovery and nutrient content of compost in terms nitrogen, potassium and phosphorous (NPK).

Data Analysis

Data gathered were analyzed using Randomized Complete Block Design (RCBD). Comparison among means was done using Duncan's Multiple Range Test (DMRT).

Efficacy Testing of Organic Fertilizer Produced in Combination with Trichoderma spp. in Pechay and Lettuce Production

The best organic fertilizer produced in Experiment C was tested for efficacy in combination with *Trichoderma* spp. in pechay and lettuce. Efficacy of the produced organic fertilizer was compared with the commercial organic fertilizer for both crops.

The experiment was laid-out in the field with plot size of 1 x 6 m. The treatments used were:

Treatment 1= Organic fertilizer produced (5 t/ha) + *Trichoderma* spp. (25 kg/ha)
Treatment 2 = Commercial organic fertilizer (5 t/ha) + *Trichoderma* spp. (25 kg/ha)

Experimental Design

The experiment was laid out following the Randomized Complete Block Design (RCBD) with three replications for each treatment.

Data Gathered

The following data were gathered: plant height at harvest; leaf diameter; number of leaves per plant; computed yield/ha.

Data Analysis

Data gathered were analyzed using Randomized Complete Block Design (RCBD). Comparison among means was done using Duncan's Multiple Range Test (DMRT).

Results and Discussion

Trichoderma spp. Isolated from Carabao Manure as Compost Activator

The application of *Trichoderma* spp. in the first experiment showed that the number of days to harvest did not differ among treatments, regardless of stage and frequency of application (Table 1). Total number of days from piling to harvesting was recorded at 74 days for those compost pile applied with *Trichoderma* spp. while the control pile (without *Trichoderma* spp.) took 102 days to mature. The result confirmed the finding of Cuevas, 1997 and Lopez, 2015 that inoculation of *Trichoderma* spp. shortened the composting period compared to conventional method of composting.

Percent recovery from each treatment was recorded to determine which combination or treatment gave the highest percent recovery. Based from the harvested compost, three treatments significantly obtained comparable percentage recovery: rice straw + carabao manure (T1) with 64.50 % recovery; rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH +2 kg *Trichoderma* spp. per ton of compost pile applied during piling (T2) with 65.0% recovery; and rice straw (75%) + ipil-ipil leaves (25%) + carabao manure +commercial compost activator (T6) with 63.17% recovery. The lowest recovery was recorded at rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during

first and second turning of compost pile + actinomycetes on the last turning of pile (T5) with 48.50 % recovery.

Temperature reading was monitored weekly until the eight week of the compost pile (Figure 1). High temperature was recorded in all the compost piles during the first week but suddenly dropped on the second week. After the turning on the second week, compost temperature again increased and from the 4^{th} up 8^{th} weeks, the temperature of the different compost piles gradually decreased. The temperature reading gets lower and stable as an indication of the compost pile being fully decomposed and ready for harvest. Temperature plays a very important role during the process of decomposition. High temperature is good for speeding up composting and for killing the pathogens. The optimum temperature for refuse/sludge mixtures composting is between 45^0C and 60^0C (Kitto, 1988). Increased temperature reading in the compost pile indicates the growth of microorganisms that generate heat during the composting period (Kabbashi, 2007).

Table 1. Response of different treatments as affected by the application of *Trichoderma* spp.

Treatments	Days to Maturity	Percent Recovery(%)
T1= rice straw+carabao manure	102[a]	64.50[ab]
T2 = rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling	74[b]	65[a]
T3 = rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 2 kg *Trichoderma* spp. applied during piling (1 kg) and during first turning (1 kg) of compost pile	74[b]	49.33[d]
T4 = rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile	74[b]	56.17[c]
T5 = rice straw (75%) + ipil-ipil leaves (25%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile + actinomycetes on the last turning of pile	74[b]	48.50[d]
T6 = rice straw (75%) + ipil-ipil leaves (25%) + carabao manure +commercial compost activator	74[b]	63.17[b]

Means followed by the same letter(s) are not significantly different at 5% level of significance using DMRT.

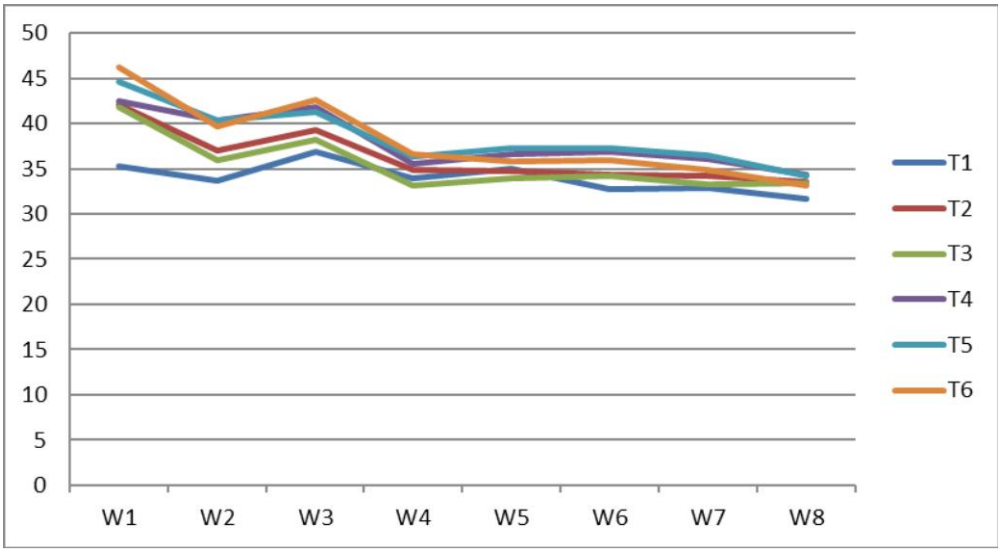

Figure 1. Temperature reading from the different treatments of compost piles

Since composting materials in all the treatments are the same and only the time and frequency of *Trichoderma spp.* application was varied, composite sample of the organic compost (1 kg) from different treatments were collected and were submitted to the Regional Soils Laboratory Office at San Fernando, Pampanga. Results of the analysis showed 34.1% Organic Matter (OM); 2.67% Total Nitrogen (N); 0.45% Total Phosphorus (P2O5); and 0.82% Total Potassium (K2O). The total NPK at 3.94% showed that the produce is categorically a compost/soil conditioner based on the Philippine National Standards for organic fertilizer.

Application of Trichoderma spp. with Increased Amount of Greens

To increase the NPK content of the compost produced in Experiment A, another experiment was set-up by increasing the percent of greens and with the addition of raw materials such as kakawate leaves and banana bracts . As seen in Table 2, days to harvest as affected by the application of *Trichoderma* spp. and addition of green leaves showed that rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (T2); rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. applied during piling (1 kg) and during first turning (1kg) of compost pile (T3); rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2

kg *Trichoderma* spp. applied during piling (1 kg) and during first and second turning (1 kg) of compost pile + actinomycetes on the last turning of pile (T5); and rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure +commercial compost activator (T6) recorded the shortest day to decompose at 69 days. Rice straw + carabao manure (T1) recorded the longest number of days to decompose at 82 days.

Percent recovery showed that rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (T2) recorded the highest recovery of 63.34%, followed by rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. applied during piling (1 kg) and during first and second turning (1 kg) of compost pile + actinomycetes on the last turning of pile (T5) with percent recovery of 60.52%.

Rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first turning (1 kg) of compost pile (T3) and rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile (T4) have similar percent recovery of of 57.08%. Rice straw + carabao manure (T1) registered the lowest percentage recovery of 34.25%.

Based from the result, combination of rice straw (70%) + ipil-ipil leaves + kakawate + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. applied during piling and during first and second turning of compost pile + actinomycetes on the last turning of pile (T5) recorded the highest NPK analysis of 5.3% and the shortest period to decompose (69 days) although percent recovery was not the highest. Lopez, *et al.* ,2015 in their study indicated that the application of the combined two species of *Trichoderma* increased the nutrient content of the compost. Meanwhile, Pascual, 2013 revealed in his research, that the raw material combination of 30% browns+ 30% greens + 40% banana bract (P_2O_5 and K_2O Source) produced the highest percent nitrogen (1.91%) and phosphorus (0.52%) in the compost product while for higher percent potassium (0.62%), the combination of 25% Browns + 25% Greens + 50% Banana Bract is recommended.

Table 2. Response of different treatments as affected by the application of *Trichoderma* spp. with increased amount of greens.

Treatments	Days to Harvest	Percent Recovery(%)
T1 – rice straw + carabao manure	82[a]	34.25[d]
T2 –rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling	69[c]	63.34[a]
T3 – rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first turning (1 kg) of compost pile	69[c]	57.08[bc]
T4 – rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile	76[b]	57.08[bc]
T5 - rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 1 kg *Trichoderma* spp. applied during piling and 1 kg during first and second turning of compost pile + actinomycetes on the last turning of pile	69[c]	60.52[ab]
T6 - rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure +commercial compost activator	69[c]	55.19[c]

Means followed by the same letter(s) are not significantly different at 5% level of significance using DMRT.

Decomposition Period as Affected by Increasing Rate of Trichoderma spp. Application

Results in Table 3 showed that application of 6 kg *Trichoderma* spp. shortened the decomposition period (66 days) of the compost pile while the compost pile applied with 2 kg took 72 days to harvest. Percent recovery showed that compost pile applied with 4 kg and 6 kg *Trichoderma* spp. significantly produced similar percent recovery of 69.31%. An almost similar high percentage recovery of 67.0% was attained in the study conducted by Lopez *et al.*, 2015, when the combination of the two species of *Trichoderma* spp. was applied in the compost.

Efficacy of Organic Fertilizer Produced in Combination with Trichoderma spp. in Pechay and Lettuce Production

The organic fertilizer produced with 5.3% NPK analysis was tested for efficacy in combination with *Trichoderma* spp. in pechay and lettuce production. The experiment was established at the RM-CARES experimental area. Efficacy of the produced organic fertilizer was compared with the commercial organic fertilizer for both crops.

Table 3. Response of different treatments as affected by increasing rate of *Trichoderma* spp.

TREATMENTS	Days to Harvest	Percent Recovery (%)
T1= rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure + CRH + 2 kg *Trichoderma* spp. per ton of compost pile applied during piling (1 kg) and during first and second turning (1 kg) of compost pile + actinomycetes on the last turning of pile	72[a]	61.51[b]
T2= rice straw (70%) + ipil-ipil leaves + kakawate leaves + banana bracts (30%) + carabao manure + CRH + 4 kg *Trichoderma* spp. per ton of compost pile applied during piling (2 kg) and during first and second turning (2 kg) of compost pile + actinomycetes on the last turning of pile	69[b]	69.31[a]
T3= rice straw (70%) + ipil-ipil leaves+ kakawate leaves + banana bracts (30%) + carabao manure + CRH + 6 kg *Trichoderma* spp. per ton of compost pile applied during piling (3 kg) and during first and second turning (3 kg) of compost pile + actinomycetes on the last turning of pile	66[c]	69.31[a]

Means followed by the same letter(s) are not significantly different at 5% level of significance using DMRT.

Pechay

Performance of pechay as affected by the application of organic fertilizer produced using the recommended rate of 5t/ha combined with *Trichoderma* spp. at the rate of 25 kg/ha showed that plants applied with organic fertilizer produced from the experiment significantly produced taller plants (20.66 cm) compared to plants applied with commercial organic fertilizer which obtained plant height of 19.93 cm. No significant differences were observed in leaf diameter and on the number of leaves per plant. However, yield per hectare showed significant yield advantage on plants applied with the organic fertilizer

produced from the experiment combined with *Trichoderma* spp., with computed yield of 9.04 t/ha. Plants applied with the commercial organic fertilizer combined with *Trichoderma* spp. obtained a lower computed yield of 7.65t/ha.

The findings indicate that the organic fertilizer produced from the combination of different materials plus the application of *Trichoderma* spp. significantly influenced the growth and yield performance of pechay.

Table 4. Performance of pechay as affected by the application of organic fertilizer produced combined with *Trichoderma* spp.

TREATMENTS	Plant Height (cm)	Diameter (cm)	No. of Leaves per Plant	Computed Yield (t/ha)
T1= Organic Fertilizer Produced(5 t/ha) + *Trichoderma spp.* (25 kg/ha)	20.66[a]	10.08[a]	9[a]	9.04[a]
T2= Commercial Organic Fertilizer (5 t/ha) + *Trichoderma spp*. (25 kg/ha)	19.93[b]	9.49[a]	8[a]	7.65[b]
CV (%)	0.73	0.25	4.71	2.75

Means followed by the same letter are not significantly different at 5% level of significance using DMRT.

Lettuce

Performance of lettuce as affected by the application of organic fertilizer combined with *Trichoderma* spp. showed that plants applied with the organic fertilizer produced significantly affected the growth of lettuce (Table 5).

Plants applied with the organic fertilizer produced at the rate of 5 t/ha combined with *Trichoderma* spp. at 25 kg/ha produced taller plants with wider leaf diameter and heavier plants that resulted to a computed yield of 5.24 t/ha compared to the plants applied with commercial organic fertilizer with a lower computed yield of 5.12 t/ha.

The results showed that the organic fertilizer produced from the experiment is comparable with the organic fertilizer available in the market in terms of efficacy in lettuce production.

Table 5. Performance of lettuce as affected by the application of organic fertilizer produced combined with *Trichoderma* spp.

TREATMENTS	Plant Height (cm)	Diameter (cm)	No. of Leaves per Plant	Wt. per Plant (g)	Survival (%)	Computed Yield(t/ha)
T1= Organic Fertilizer Produced (5 t/ha) + *Trichoderma* spp. (25 kg/ha)	20.65[a]	11.01[a]	11.25[a]	38.50[a]	86.86[a]	5.24[a]
T2= Commercial Organic Fertilizer (5 t/ha) + *Trichoderma* spp. (25 kg/ha)	19.60[b]	10.20[b]	9.25[b]	29.13[b]	86.14[a]	5.12[b]
CV (%)	1.17	2.03	5.63	5.22	0.58	0.65

Means followed by the same letter(s) are not significantly different at 5% level of significance using DMRT.

Conclusion

Trichoderma spp. isolated from carabao manure was proven to be effective as decomposer in the production of organic fertilizer. Increasing the rate of *Trichoderma* spp. to 6 kg for every ton of compost pile shortened the decomposition period to 66 days and increased the percent recovery at 69.31%. The quality and nutrient content (NPK) of produced organic fertilizer obtained the required NPK content (5.3%) as stipulated in the Philippine National Standards for Organic Agriculture.

The organic fertilizer produced significantly influenced the growth and yield performance of pechay and lettuce with higher computed yield per hectare, compared with commercially available organic fertilizer.

Another experiment is recommended to verify the efficiency of using 6 kg of *Trichoderma* spp. vis-à-vis percent recovery, days to harvest and NPK content. Conduct of verification trials on the combined use of organic fertilizer and *Trichoderma* spp. in other leafy vegetables is also recommended.

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