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Effect of Compost Tea and Harvest Age on Productivity, Nutrient Content, and *In vitro* Digestibility *Cichorium Intybus*

Rezki Amalyadi¹, Nafiatul Umami^{2*}, Nanung Agus Fitriyanto³, Chusnul Hanim², and Bambang Suwignyo²

¹Department of Animal Nutrition and Feed Science, Faculty of Life Science and Technology, Universitas Teknologi Sumbawa, Sumbawa, 84371, Indonesia

²Department of Animal Nutrition and Feed Science, Faculty of Animal Science, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia

³Department of Animal Products Technology, Faculty of Animal Science, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia

ABSTRACT

The glass house experiment involving compost tea and harvest age was conducted to investigate the effect of giving compost tea (cricket and rabbit feces) and harvesting age on productivity, nutrient content, and *in vitro* digestibility value of *Cichorium intybus*. Compost tea (CT) is an aqueous extract from compost that can correct nutrient deficiencies during crop production and protect cultivation. The research treatment consisted of two factors, namely: the age of harvest and the dose of compost tea. The administration of compost tea consisted of three kinds of doses as follows: no compost tea (P0), 200 mL of compost tea (P1), and 400 mL of compost tea (P2). The experimental plants were harvested at different age, consisting of 25, 35 and 45 days after planting (DAP). The experimental design was Factorial Completely Randomized Design (CRD) with 6 treatments and 9 replications. The data were statically analyzed using analisis of variance, and differences among value of each treatment were tested with the Duncan Multiple Range Test. The results indicated that compost tea dose and harvesting period treatment affected ($P < 0.05$) leaf length, fresh leaf weight, crude protein content, dry matter digestibility (DMD), and organic matter digestibility (OMD). Meanwhile, it showed not significant effect ($P > 0.05$) on the leaf width and root length. The results suggest that the fertilization treatment of 200 mL of compost tea and 25 DAP could increase productivity (leaf length and fresh leaf weight) of chicory, nutrient content (crude protein) of chicory, and *in vitro* digestibility (DMD and OMD).

Keywords: *Cichorium intybus*, Compost tea, *In vitro* digestibility, Nutrient content, Productivity

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* Corresponding author:

Telp. +62 878 3937 5048

E-mail: nafiatul.umami@ugm.ac.id

Introduction

Fertile and productive land are mostly used for growing high value crops, and very scarce for growing forage crops. One solution to overcome this problem is to use marginal or less productive lands by improving soil nutrient availability according to plant needs (Seseray *et al.*, 2013). To reduce soil fertility deterioration and increase sustainable yield productivity, it is necessary to use adequate organic fertilizers in quantity, quality, and continuity (Hartatik *et al.*, 2015). Islam *et al.* (2016) explained that compost tea (CT) is a water extract from compost and can be used to fulfill the deficiency of nutrients during plant production and to protect cultivation. In particular, CT applied to the soil affects the plant rhizosphere by carrying nutrients and microorganisms.

Meanwhile, CT sprayed on the leaf surface usually alters the assemblage of organisms on the foliage through the inoculation of beneficial microorganisms against various plant pathogens and microbial supply by-products nutrients help the survival of the microorganisms of the philosopher.

Forages are classified into 3 groups, namely grasses, legumes, and forbs. Forbs are a class that do not include grasses and legumes, with bush-shaped and non-woody stems that indirectly affect grazing productivity and soil quality. One of the forbs is chicory. Chicory of *Cichorium intybus* is a perennial shrub, cultivated for vegetables, medicine, coffee substitutes, and animal feed (Neciu *et al.*, 2017). Previous studies involving fertilizer on chicory including photosynthetic pigments and the uptake of several

soil elements derived from organic fertilizers have been carried out. Gholami *et al.* (2019) explain that organic fertilizers such as humic acid and vermicompost are the best way to achieve safe production. Gholami *et al.* (2019) explain results suggest that humic acid and vermicompost improve nutrient uptake, yield, and photosynthetic pigment concentration of chicory. The highest values of N (4.64%) and P (0.83%) were found in the 10 ton/ha vermicompost treatment combined with 0.6 kg/ha humic acid treatment. The maximum potassium content (11.05%) was obtained by applying 0.6 kg/ha of humic acid and vermicompost (7.5 ton/ha) (Gholami *et al.*, 2019). The use of compost tea that has been carried out, such as the growth response of Pak coy (*Brassica rapa L*) plants with the provision of chicken feather compost tea in the hydroponic system gave significant results on plant height, the number of leaves, leaf color, wet weight, and dry weight of Pak coy (Rianti *et al.*, 2019).

The nutritional quality of the *Cichorium intybus* is influenced by the proportion of leaves and stems. Harvest age affects fresh and dry matter production. If the cutting interval is extended, there will be a decrease in crude protein content (Savitri *et al.*, 2012). Hutabarat *et al.* (2017) explained that the best quality of forage obtained at the end of the vegetative phase or towards the reproductive phase. After passing through the vegetative phase (generative phase), the nutritional quality has decreased, while the crude fiber content increases. Referring to these conditions, it is expected that harvesting at 25, 35, and 45 days after planting (DAP) and giving compost tea at specific doses can increase productivity, nutrient content, and *in vitro* digestibility in *Cichorium intybus* plants.

Materials and Methods

Time and place of the study

This study was conducted from July to December 2020 at the Agricultural Research and Development Agency, Yogyakarta; Environmental Quality Laboratory, Faculty of Civil Engineering and Planning, Indonesian Islamic University; Laboratory of Food Technology and Agricultural Products, Integrated Research and Testing Laboratory, Laboratory of Nutritional Biochemistry and Laboratory of Forage and Pasture, Faculty of Animal Husbandry, Gadjah Mada University.

Research material

This study employed instruments such as scales, hand spray, polybags measuring 18 x 23 cm with a diameter of 22 cm, cutter blades, soil sieves, a set of tools for proximate (dry matter, ash, crude fat, crude protein, and crude fiber) and a set of tools for *in vitro* digestibility test (digestibility of dry matter and digestibility of organic matter). The materials used were chicory (*Cichorium intybus*), water, and compost tea

from crickets and rabbit feces as well as cow rumen fluid.

Research method

This study used a completely randomized design (CRD) with a 3 x 3 factorial consisting of compost tea dosage treatment and harvesting age, 9 treatment with 6 replications each, using 54 polybags. The treatment arrangement was as follows: P0U1, P0U2, P0U3, P1U1, P1U2, P1U3, P2U1, P2U2, dan P2U3.

Description:

P0 = Fertilizer control

U1= Harvesting age of 25 DAP

P1 = 200 mL

U2= Harvesting age of 35 DAP

P2 = 400 mL

U3= Harvesting age of 45 DAP

Compost tea was made using the aerated compost tea (ACT) method in which compost tea was supplied with oxygen by stirring during its making process. The materials used were rabbit feces, cricket feces, molasses, EM-4, water, filter cloth, and rope. The instruments used were a barrel and an aerator. The steps for making compost tea were as follows: (1) preparing tools and materials; (2) preparing a solution consisting of water (10 L), which then is mixed with EM-4 (100 mL) and molasses (100 mL); (3) putting rabbit and cricket dropping 5 kg each into the filter cloth and laced then soaked in the solution that has been made; and (4) aerating the materials that have been immersed in the solution using an aerator for 7 days. The composting requirements run well with the existing things as follows: (1) foodstuff for microbes, (2) water (50% - 60%), (3) temperature (24 - 40°C for mesophyll microorganisms and 40 - 70°C for thermophile microorganisms), (4) pH (6.0 - 7.5) and (5) oxygen (>10%). Compost as a composting product needs to be measured its quality (Berek, 2017). The compost tea was applied to chicory plants by spraying the chicory leaves and watering the surrounding chicory soil. Compost tea was sprayed on the leaves as much as 200 mL and on the soil 800 mL.

The cultivation preparation was started with cleaning the soil to be used in advance using water and sieved to remove small stones or gravel, then homogenized and put into polybags as much as 5 kg and mixed with 1 kg of organic fertilizer (livestock manure and organic waste that has been processed by microorganisms into manure). Two chicory plantlets were transplanted from seedling bed to a polybag. Watering was done every day with 200 mL of water per polybag. Fertilization was done since the chicory began to grow. Harvesting was carried out 3 times, at 25, 35, and 45 DAP. Plant productivity measured includes leaf length, plant height, plant diameter, leaf weight, and root weight. Sampling was carried out in each polybag. Crude protein content, crude fat, dry matter, ash, and crude fiber were analyzed according to AOAC (2005). *In vitro* digestibility

experiments using a set of *in vitro* equipment were based on Tilley and Terry's instructions (1963).

Parameters observed were productivity (biomass production), nutrient content, and *in vitro* digestibility values of chicory.

The data obtained from the analysis were statistically processed (SPSS) version 23 using a Completely Randomized Factorial Design (CRD) and statistically analyzed (SAS) if there was an interaction between treatments. The difference between treatments was tested using Duncan's Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

Soil nutrient content

Nutrients are a source of food that plants need, whether they are nutrients available in nature (organic) or intentionally added. The most nutrients in the soil needed for plant growth and development are only N, P, and K. The nutrient content is presented in Table 1. Fertilization needs to be done because the soil's nutrient content varies and changes due to loss of nutrients through leaching. Nowadays, inorganic fertilizers tend to be excessive which results in the soil being polluted and decreasing in quality. Therefore, the application of organic fertilizers is pursued. It has the benefit of maintaining or improving soil quality and the need to balance the use of organic and inorganic fertilizers (Ariyanti *et al.*, 2017). Nath (2013) suggests that fertilization is a crucial way to increase plant productivity and soil quality.

Table 1. Nutrient of soil content as a growing medium chicory

Parameters	Contents
Nitrogen - total (%)	2.52±0.08
Potassium (K) (K/Kg)	34.9±2.80
Phosphate (mg/L)	1.26±0.01

Compost tea nutrient content

Compost tea is defined as compost extract that is brewed with microbes in a liquid medium. Besides providing nutrients when given to plants, compost tea is also equipped with microorganisms. The finished compost contains micro and macronutrients that are good for plants and good for improving the soil's physical, chemical, and biological properties. The macro and micronutrient content in compost tea can be seen in Table 2. The results of the analysis of nutrients N (0.56%) and P (1.02%) in compost tea in this study were not following the standardization of organic fertilizers N and P (2% - 6%). Although the amount of N and P is low in content, compost tea has a good impact on plant growth and development. Hartatik *et al.* (2015) explain that the role of organic fertilizers on soil physical properties includes (a) improving soil structure because organic matter can "bind" soil particles into stable aggregates, (b) improving soil pore size distribution to improve the water holding capacity of the soil and the movement of air (aeration) in the soil, and (c) reducing (buffer) fluctuations in

soil temperature. The C/N value of compost ratio, according to SNI 19-7030-2004, is 10-20. The compost tea fertilizer above met the standards according to SNI 19-7030-2004. The C/N ratio contained in the compost describes the level of maturity of the compost. The higher the C/N ratio means the compost has not broken down entirely or in other words, it is not yet ripe and not ready to be used as fertilizer (Tantri *et al.*, 2016). Organic material with an excellent composting process becomes mature compost if it has a C/N ratio of 10-20. According to the minister of agriculture and SNI (Indonesian National Standard) regulation, compost is ripe if the C/N ratio is below 20. The C/N ratio might affect the availability of nutrients. If the C/N ratio is high, the nutrient content is less available for plants. On the other hand, if the C/N ratio is low, the nutrient availability is high and available for plants. Even though it is not balanced in the compost, it does not meet the standards, but it has a large enough influence on plant growth and development as seen from the results of the application of compost tea.

The productivity of chicory (*Cichorium intybus*)

The chicory productivity included leaf length, leaf width, plant height, plant diameter, number of leaves, leaf fresh weight, root length, and root weight as presented in Table 3. Leaf length shows a significant difference in the average treatment ($P < 0,05$). This indicates that the age of harvest and compost tea fertilization had a significant impact on leaf length. To get the maximum leaf length, it is recommended that the harvest at 35 DAP and given 400 mL of fertilizer. The results above are not supporting the previous study conducted by Kefyalew *et al.* (2020) where the length of the leaves also increased with age. Hariodamar *et al.* (2018) explained that the treatment of varieties and treatment of N fertilizers had a significant effect on leaf area per plant. Plant height shows a significant difference in the mean fertilizer treatment where $P < 0.05$. Meanwhile, the harvest age treatment did not give a significant difference ($P > 0.05$). To get the maximum plant height, 400 mL of fertilizer is recommended. Safrida *et al.* (2019) describe environmental conditions that vary from place to place and the need for plants to special environmental conditions might result in the diversity of plant growth. Furthermore, differences in genetic makeup are one of the factors causing the diversity of plant appearance. In general, the difference in dosage types in compost application has a significant effect on plants' vegetative and generative growth (Maryanto and Rahmi, 2015). Plant diameter shows a significant difference in the mean fertilizer treatment where $P < 0.05$. Meanwhile, in the treatment, the harvest age did not significantly differ ($P > 0.05$). Fertilizer of 400 mL is recommended to get the maximum plant diameter. This indicates that nitrogen fertilizers can supply nutrients for vegetative growth such as plant height, number of leaves, and stem diameter

Table 2. The content of compost tea with basic ingredients of rabbit and cricket feces with aeration technique

Parameters	Contents	Standard quality
C-organic (% w/v)	11.30	Minimum 10
Macronutrients		
N (% w/v)	0.56	2-6
P ₂ O ₅ (% w/v)	1.02	2-6
K (mg/kg)	2788.98	-
Micronutrients		
Total Fe (mg/kg)	22.74	90-900
Total Mn (mg/kg)	4.53	25-500
Total Cu (mg/kg)	0.23	25-500
Total Zn (mg/kg)	1.11	25-500
Total B (ppm)	3	12-250
C/N Ratio	20.17	10-20
pH	5.64	4-9
<i>E. coli</i> (cfu/mL or MPN/mL)	4	<1 x 10 ²
<i>Salmonella</i> sp. (25 gram/sample)	Negative	-
Heavy metal		
As (ppm)	0.01	Maximum 5.0
Hg (µg/L)	1.58	-
Pb (mg/kg)	Not found	-
Cd (mg/kg)	Not found	-
Cr (mg/kg)	Not found	-
Ni (mg/kg)	Not found	-

Table 3. The average productivity of chicory with different treatment of harvest age and compost tea (*Cichorium intybus*)

Treatments	Length of chicory leaves (cm)			Average
	Harvest age			
	25 days	35 days	45 days	
P0	32.67±0.58 ^{yz}	32.00±0.00 ^{yz}	30.33±2.08 ^z	31.67±0.89 ^c
P1	34.67±1.53 ^{xy}	39.17±1.04 ^w	36.67±1.53 ^{vw}	36.84±1.37 ^b
P2	42.33±2.08 ^y	44.67±2.57 ^v	39.00±1.00 ^w	42.00±1.89 ^a
Average	36.55±1.40 ⁱ	38.61±1.20 ^k	35.33±1.54 ^l	
	Height of the chicory plant (cm)			
P0	32.00±9.54	29.33±0.58	30.67±3.78	30.67±4.63 ^a
P1	31.00±3.60	34.67±3.05	33.33±3.05	33.00±3.23 ^a
P2	39.67±4.72	40.67±5.51	38.67±2.89	39.67±4.37 ^b
Average	34.22±5.95 ^{ns}	34.89±3.05 ^{ns}	34.22±3.24 ^{ns}	
	Diameter of chicory plants (cm)			
P0	2.45±0.20	2.59±0.27	2.56±0.12	2.53±0.20 ^a
P1	3.44±0.43	3.16±0.99	3.40±0.56	3.33±0.66 ^b
P2	4.48±0.58	4.31±0.90	4.01±0.28	4.27±0.59 ^c
Average	3.46±0.40 ^{ns}	3.35±0.72 ^{ns}	3.32±0.32 ^{ns}	
	Fresh weight of chicory leaves (g)			
P0	51.00±11.36 ^z	48.67±17.21 ^z	47.33±10.06 ^z	49.00±12.88 ^a
P1	85.33±8.33 ^{yz}	116.33±25.15 ^{yz}	123.33±23.54 ^y	108.33±19.01 ^b
P2	114.00±27.00 ^{yz}	202.67±75.50 ^x	270.00±64.78 ^w	195.56±55.76 ^a
Average	83.44±15.56 ⁱ	122.55±39.29 ^k	146.88±32.79 ^k	
	Weight of chicory root (g)			
P0	34.33±10.78	40.33±26.73	42.00±10.44	38.89±15.98 ^a
P1	58.00±12.49	42.33±33.60	37.00±22.91	45.78±23.00 ^a
P2	126.3±29.14	88.33±16.26	84.00±33.04	99.54±26.15 ^b
Average	72.88±17.47 ^{ns}	56.99±34.11 ^{ns}	54.33±22.13 ^{ns}	

^{a,b,c} Different superscripts in the same column showed significant differences (P<0.05) in the treatment mean score.

^{k,l} Different superscripts on the same line showed significant differences (P<0.05) in the treatment mean score.

^{v,w,x,y,z} Different superscripts on the same row and column showed significant differences (P<0.05) in the treatment mean.

^{ns} Different superscripts in the same line showed no significant difference (P>0.05) in the average treatment.

growth (Wiekandyne, 2012). If the nitrogen element is met, the formation of chlorophyll, protein synthesis, the formation of new cells can be achieved to increase the stem's diameter (Satria *et al.*, 2015). Leaf fresh weight shows a significant difference in the mean fertilizer treatment and the harvest age (P<0.05). It is recommended to give 400 mL of fertilizer and harvest at 45 DAP to get the maximum leaf weight. Afzal *et al.* (2012) added that nitrogen content in the growing medium would increase yield weight and increase fresh and dry biomass. Wahono *et al.* (2018) stated that harvest age treatment affects the weight of stover per plant because the older the harvest age is proportional to the amount of fresh weight of stover per plant that is wasted. Root weigh shows a significant

difference in the mean fertilizer treatment (P<0.05). Meanwhile, harvest treatment did not give a significant difference (P>0.05). Total of 400 mL of fertilizer is recommended to get the maximum root weight. Ahmad *et al.* (2016) stated that fertilization had a significant effect on the wet weight of plant roots where the complete nutrient content and hormones would spur the formation of suitable plant organs. This content might stimulate the cell division process to enable the growth process to go well. Febriyono *et al.* (2017) explained that the roots that spread (long) resulted in high root fresh weight. In water stress conditions, plants might form larger root growths compared to plants whose water needs are fulfilled. The nature of root growth is positive geotropic. Root growth might be better if the

Table 4. The average proximate analysis of chicory with different treatment of harvest age and compost tea (*Cichorium intybus*)

Treatments	Dry matter of chicory (%/100 g)			Average
	Harvest age			
	25 days	35 days	45 days	
P0	12.30±0.62	9.89±0.60	8.16±0.64	10.12±0.62 ^{ns}
P1	11.93±0.67	9.70±0.88	8.30±1.60	9.98±1.05 ^{ns}
P2	11.94±0.67	8.77±0.32	7.55±0.32	9.42±0.44 ^{ns}
Average	12.06±0.65 ^a	9.45±0.60 ^d	8.00±0.85 ^c	
	Crude protein content (%/100 g)			
P0	24.92±0.64 ^w	21.36±2.95 ^{xy}	19.41±1.79 ^{yz}	21.90±1.79 ^b
P1	24.32±0.85 ^w	25.24±0.56 ^w	17.23±2.40 ^z	22.26±1.27 ^b
P2	22.82±0.52 ^{wx}	19.74±1.03 ^{yz}	17.61±1.07 ^z	20.06±0.87 ^a
Average	24.02±0.67 ^k	22.11±1.51 ^l	18.08±1.75 ^m	
	Crude fat content (%/100 g)			
P0	2.62±0.05	2.85±0.79	3.68±0.26	3.05 ^a ±0.37
P1	4.41±0.58	4.81±0.12	4.45±0.79	4.56 ^a ±0.50
P2	3.32±0.34	3.43±0.34	3.53±1.13	3.43 ^b ±0.60
Average	3.45±0.32 ^{ns}	3.70±0.42 ^{ns}	3.89±0.73 ^{ns}	
	Crude fibre content (%/100 g)			
P0	11.49±0.33	10.70±0.55	13.43±0.79	11.87±0.56 ^{ns}
P1	10.92±0.24	10.80±0.54	13.18±0.76	11.63±0.51 ^{ns}
P2	11.67±0.96	10.56±0.24	12.12±1.49	11.45±0.90 ^{ns}
Average	11.36±0.51 ^a	10.69±0.44 ^a	12.91±1.01 ^b	

^{a, b, c} Different superscripts in the same column showed significant differences (P<0.05) in the treatment mean score.

^{k, l, m} Different superscripts on the same line showed significant differences (P<0.05) in the treatment mean score.

^{w, wx, xy, yz, z} Different superscripts on the same row and column showed significant differences (P<0.05) in the treatment mean.

^{ns} Different superscripts in the same line showed no significant difference (P>0.05) in the average treatment.

supply of nutrients is sufficient, enabling the root weight to increase.

Proximate analysis of chicory (*Cichorium intybus*)

Proximate analysis is a chemical analysis method to identify nutritional content such as protein, carbohydrate, fat, and fiber in a food substance from feed or food. Proximate analysis was performed to determine the dry weight, crude protein, crude fat, and crude fiber shown in Table 4. Dry weight shows a significant difference in the average treatment at harvest age (P<0.05). Meanwhile, the fertilizer treatment did not give any significant differences (P>0.05). To get the maximum dry matter, harvesting is recommended to be done 25 DAP. Dry matter content of the plant was not in accordance with the explanation of Prayoga *et al.* (2018) argue that the older the forage, the less water content and the higher proportion of cell walls compared to cell contents. The higher the cell wall component, the higher the dry matter content. Not in accordance with the Wati *et al.* (2017) explained that the longer the plant age, the higher the weight of consumption in the treatment of harvest age. Farda *et al.* (2020) stated that the dry matter content in plant material increases with the plant's age. Crude protein shows a significant difference in the average treatment (P<0.05). Crude protein showed no significant difference in the mean treatment (P<0.05). Judging from the results of the highest crude protein content, the best treatment was 35 days after planting and 200 mL of fertilizer. The difference in the value of each plant's crude protein content was influenced by many factors, including plant species, harvest age, soil type, and soil fertility (Hermanto *et al.*, 2017). Safira *et al.* (2019) explained there is a tendency to increase crude protein content with increasing doses of urea fertilizer because urea fertilizer is very

important to obtain high crude protein content. Giving compost tea to turfgrass did not have a significant effect on organic matter content, soil microbial activity, soil volume weight and soil infiltration (Chen, 2015). This is one of the reasons that the addition of the compost tea dose did not increase the crude protein content of the plant. Crude fat shows significant difference in the mean fertilizer treatment (P<0.05). Meanwhile, the harvest age treatment did not give a significant difference (P>0.05). It is recommended to give 200 mL of fertilizer to get the maximum crude fat. Setyaningrum and Dahlan (2018) explain that the use of manure or compost provides a higher crude fat content compared to without fertilizer treatment. This is because the nitrogen content in manure affects crude fat. Syamsuddin (2013) explains that compost fertilizer treatment shows a higher yield of crude fat than treatment without fertilizer and treatment with liquid fertilizer. Crude fiber shows a significant difference in the mean of harvesting age treatment (P<0.05). Meanwhile, the fertilizer treatment did not give any significant difference (P>0.05). It is recommended to harvest at the age of 35 DAP to get minimum crude fiber. Hajar *et al.* (2019) explain that the older the plant, the higher the lignification on the walls. Increasing cell walls might reduce the number of carbohydrates, fibers associated with cell walls/NDF. Savitri *et al.* (2012) also explain that the increase in crude fiber production was due to the higher lignification process and the length of the cutting life.

In vitro digestibility of chicory (*Cichorium intybus*)

Digestibility value is an early sign of nutrient availability in certain animal feed ingredients. Digestibility value is an early sign of depriving nutrients in certain animal feed ingredients. High digestibility indicates that a lot of

Table 5. The average *in vitro* digestibility of chicory with different treatment of harvest age and compost tea (*Cichorium intybus*)

Treatments	Dry matter digestibility of chicory (%)			
	Harvest age			Average
	25 days	35 days	45 days	
P0	81.60±0.55 ^y	81.97±0.97 ^y	77.53±0.94 ^z	80.37±0.82 ^b
P1	84.89±0.05 ^x	84.60±1.15 ^x	77.00±0.53 ^z	82.16±0.58 ^a
P2	81.97±0.54 ^y	81.44±2.20 ^y	76.11±1.33 ^z	79.84±1.36 ^b
Average	82.82±0.38 ^k	82.67±1.44 ^k	76.88±0.93 ^j	
Organic matter digestibility of chicory (%)				
P0	78.10±0.98 ^x	79.38±0.34 ^x	73.69±0.94 ^y	77.06±0.75 ^a
P1	82.44±0.45 ^w	82.42±1.90 ^w	73.05±0.94 ^y	79.30±1.10 ^b
P2	78.76±0.35 ^x	78.82±2.22 ^x	70.36±1.81 ^z	75.98±1.46 ^a
Average	79.76±0.59 ^k	80.21±1.49 ^k	72.37±1.08 ^j	

^{a, b} Different superscripts in the same column showed significant differences ($P < 0.05$) in the treatment mean score.

^{l, k} Different superscripts on the same line showed significant differences ($P < 0.05$) in the treatment mean score.

^{x, y, z} Different superscripts on the same row and column showed significant differences ($P < 0.05$) in the treatment mean.

nutrients are distributed to the livestock, while low digestibility indicates that the feed material has not been able to provide nutrients for livestock either for basic living or for production (Hartono *et al.*, 2015). The digestibility of dry matter and organic matter of chicory is presented in Table 5. Dry matter digestibility shows a significant difference in the average treatment ($P < 0.05$). This indicates that the harvest age and compost tea fertilization significantly impacted on the digestibility of dry matter. It is recommended that the harvest is conducted 25 DAP and the fertilizer is administered at 200 mL to get the maximum dry matter digestibility. The level of nutrient digestibility by livestock is influenced by the plant's content, age, and parts of the plant itself (Keraf *et al.*, 2015). Riswara *et al.* (2018) argue that the high and low dry matter digestibility is influenced by plants' crude fiber and mineral content. Organic matter digestibility shows a significant difference in the average treatment ($P < 0.05$). This suggests that the harvest age and compost tea fertilization significantly impacted the digestibility of organic matter. It is recommended that the harvest is conducted at the age of 25 DAP and the fertilizer is conducted at a dose of 200 mL. Faradilla *et al.* (2019) explained that the effect of treating the value of digestibility crude matter was different, because of the different types of forage and nutritional content. Muwahid and Ali (2020) added there was an increase in the digestibility value as the dose of "organic" foliar fertilizer was increased. Crude fiber content as well as cellulose, hemicellulose and lignin decreased along with the increase in the dose of "organic" foliar fertilizer which was given resulting in an increase in plant digestibility. Wijayanti *et al.* (2012) stated that the high content of feed crude fiber causes low digestibility value due to the high fiber walls which cause the cell walls to become thick and difficult to be penetrated by rumen microbes. *In vitro* digestibility value also affects the difference in crude fat and crude protein content. The high crude fat and low crude protein of plants can reduce digestibility *in vitro* due to increase in harvest age. Hermanto *et al.* (2017), reported that increasing harvest age significantly increased forage crude fat levels. Vinyard *et al.* (2018) explained that increasing harvest age *Eragrostis tef* grass from early reproductive phase

(boot stage) to the late flowering phase (late heading) reduced crude protein levels from 18.7% to 11.9%.

Conclusions

The results of this study showed that 200 mL compost tea fertilization treatment and 25 DAP harvest could increase the productivity (leaf length and fresh leaf weight) of chicory, nutrient content (crude protein) of chicory, and *in vitro* digestibility (crude matter and organic matter).

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