ATLANTIS PRESS

Advances in Biological Sciences Research, volume 13

Proceedings of the International Seminar on Promoting Local Resources for Sustainable Agriculture and Development (ISPLRSAD 2020)

Production and Quality of Seven Basil (*Ocimum basilicum* L.) Accessions in Various Composition of Urea Fertilizer and Mexican Sunflower Compost

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ABSTRACT

The environmentally friendly fertilizer is necessary for vegetable production that are safe for consumption and maintain soil fertility. This study aims to determine the effect of the composition of urea fertilizer and Mexican sunflower compost (MSC) on the production and quality of various basil accessions (*Ocimum basilicum* L.). This study uses a factorial completely randomized design, namely basil accession (Gegerbitung, Kadudampit 1, Kadudampit 2, Kemang, Ciaruteun, Cijujug, and Gasol) and the composition of N fertilizer (100% N-urea, 100% N-MSC, 75% N-urea + 25% N-MSC, 50% N-urea + 50% N-MSC, 25% N-urea + 75% N-MSC, and 0% N-urea + 0% N-MSC). The results showed that plants Kadudampit 2 and Gasol have growth and production better than other accessions. Plants treated with 100% N-MSC produced growth and harvest wet and dry weight not significantly different from 100% N-urea. Nitrate and vitamin C content were not significantly different between accessions. The use of 100% MSC significantly reduces leaf nitrate content. The vitamin C content was not significantly different between plants that were fertilized with various compositions of N. The content of chlorophyll a, chlorophyll b, and carotenoids of Gasol and Ciaruteun accessions were the lowest compared to the other five accessions. The highest chlorophyll a, chlorophyll b content are found in plants with Urea, followed by those given a combination of Urea + MSC. The carotenoid content of plant treated with 100% Urea was not significantly different from those fertilized with 75% Urea + 25% MSC and 25% Urea + 75% MSC.

Keywords: Basil, nitrate, vitamin C, chlorophyll, carotenoids

1. INTRODUCTION

Basil (*Ocimum basilicum* L.) is a local vegetable that is commonly consumed fresh, mixed with cooking, and used as a biopharmaceutical or ornamental plant. Basil leaves have distinctive aroma from their essential oils. Traditionally, the essential oil of basil used as an antispasmodic, aromatic, carminative, digestive, and gastric agent [1]. The content of active compounds in basil leaves can optimize health and reduce the risk of chronic diseases such as coronary heart disease, cancer, and Alzheimer's [2].

Basil is an annual herbaceous plant (Blank *et al*. 2012) [3],bush-shaped. This plant grows upright until it reaches 100 cm in height [4]. The nutritional content in 100 g of basil leaves consists of 94 KJ of energy, 2.65 g of carbohydrates, 3.15 g of protein, 1.6 g of fiber, 0.64 g of fat, 0.8 mg of vitamin E, 18 mg of vitamin C, 5275 SI vitamin A, 177 mg Ca, 56 mg P, 3.17 mg Fe, 259 mg K, 0.81 mg Zn, 3142 µg beta-carotene, 0.034 mg thiamin, 0.092 mg niacin [5].

Growth, production, and quality of basil are influenced by climatic factors and cultivation techniques, including fertilization. A nutrient that plays an essential role in the growth of leafy vegetables is nitrogen. The application of nitrogen fertilizers can increase the production and fresh weight of basil [6]. Applying fertilizer with the right dose can increase plant height, dry weight, and essential oil content of basil plants [7]. However, too high an amount of nitrogen fertilizers can reduce plant height and leaf width, thus affecting wet weight and dried basil plants [6].

Plants absorbed nitrogen in the form of nitrate and ammonium. Generally, farmers use Urea as a nitrogen source, so that Urea is the most widely used nitrogen fertilizer globally, with a content of 46% N [8]. The application of Urea fertilizer can directly increase plant productivity, especially leafy vegetables [9]. In rice, the dosage of Urea use by farmers can reach 400–600 kg/ha,Generally, farmers use urea as a nitrogen source, so that urea is classified as the most widely used nitrogen fertilizer in the world, with a content of 46% N [8] The application of urea fertilizer can directly increase plant productivity, especially leafy vegetables [9]. In rice, the dosage of urea use by farmers can reach 400–600 kg/ha, exceeding the government's recommended dosage of 200-260 kg/ha [10]

The use of Urea fertilizers with high doses can increase the nitrate content in the soil, which causes groundwater pollution [11]. Too high absorption of nitrates by plants adversely affects the health of humans who consume them [12]. The use of environment from high chemical exposure can be done by providing a source of organic nitrogen, including using Mexican sunflower compost (MSC).

Mexican sunflower (*Tithonia diversifolia*) is a herbaceous plant from the Asteraceae family that used as green manure, liquid organic fertilizer, and compost [13]. Mexican sunflower contains 3.50 - 4.00% N, 0.35-0.38% P, 3.50 - 4.10% K, 0.59% Ca, and 0.27% Mg[14]. This plant has a faster decomposition time than others a high potential for restoring soil fertility [15]. Mexican sunflower compost can be an alternative to nitrogen fertilizers that can replace or reduce the use of Urea fertilizers. This study aims to evaluate the growth, production, and quality of various accessions of basil (*Ocimum basilicum* L.) on various composition of Urea and Mexican sunflower compost.

2. MATERIALS AND METHODS

The research was conducted from February to May 2020. The temperature conditions in the field ranged from 22 -34 °C, with an average humidity of 80%. The study took place during the rainy season, with an average rainfall of 517 mm/month [16]. The field experiment was carried out at the Experimental Garden of the Agrotechnology Study Program, Faculty of Agriculture, Djuanda University, Bogor. Analysis of leaf nitrate and vitamin C content was conducted in the laboratory of the Faculty of Agriculture, Djuanda University, leaf chlorophyll content in the Testing Laboratory of the Department of Agronomy and Horticulture of IPB, and analysis of nutrients and fertilizers at the ICBB (Indonesian Center for Biodiversity and Biotechnology) laboratory Bogor.

2.1 Tools and Materials

Materials used are basil accessions from Sukabumi district (Gegerbitung, Kadudampit1 and Kadudampit2), Bogor district (Kemang, Ciaruteun, and Cijujug), and Cianjur (Gasol), polybags, medium planting (soil and husk charcoal), MSC, synthetic fertilizers (Urea, SP- 36, and KCl), insecticides, distilled water, ingredients for analysis of vitamin C (starch and iodine solution), chlorophyll (extract *acetone* and Tris HCl 1%).

2.2 Research Methods

This study used a completely randomized design (CRD) consisting of two factors, namely basil accession and a combination of N fertilizers. Basil accessions consisted of seven levels, namely Gegerbitung, Kadudampit 1, Kadudampit II, Kemang, Ciaruteun, Cijujug, and Gasol. The combination of N fertilizer consists of six levels, namely 100% N-urea, 100% N-Mexican sunflower, 75% N-urea + 25% N-Mexican sunflower, 50% N-urea + 50% Mexican sunflower, 25% N-urea + 75% N-Mexican sunflower, 0% N-Urea + 0% N-Mexican sunflower. The dose of N fertilizer used was 150 kg N $ha^{-1.}$ The experiment consist of 42 treatment combinations, with three replications. Each experimental unit consists of four observation units, so there are 504 observation units (7 x 6 x 3 x 4).

Data were analyzed using variance (Test F). If the treatment had a significant effect, means compared with *Duncan's Multiple Range Test* (DMRT) at the 0.05 level.

2.3 Research Implementation

Mexican sunflower compost is done by mixing 25 kg of chopped fresh Mexican sunflower leaves with 100g of bran, 25g of granulated sugar dissolved in water, and 5ml of EM4. The mixed compost is stored in perforated *trash bag* and left for three weeks.

Sowing basil seeds for two weeks. Then the seeds are transferred to polybags measuring 10 × 20 cm. Transplanting the seedlings into polybags measuring 30 cm x 40 cm is done at the age of four weeks after seeding. The planting medium used for the nursery and planting is a mixture of soil and husk charcoal with a volume ratio of 1: 1. Watering, controlling pests, diseases, and weeds were carried out according to agricultural cultivation standards.

Fertilization is given based on the level of treatment. Urea fertilization is carried out gradually; 50% as a primary fertilizer and 25% as an additional fertilizer at the age of 3 and 6 weeks after planting (WAP). Mexican sunflower compost is given at once a week before planting, while SP-36 and KCl are given 100% as essential fertilizer.

Synthetic chemical fertilizer and MSC dosage per polybag were calculated by converting the fertilizer requirement per plant with a spacing of 50 x 25 cm (Table 1).

Table 1. Doses of chemical fertilizers and MSC for basil plants per polybag until the age of 8 WAP

Type of Fertilizer	Fertilizer dose	
	Per hectare	**Per plant**
Urea	326.09 kg/ha	5.43 g
SP-36	416.67 kg/ha	6.94 g
KCl	250.00 kg/ha	4.20 g
MSC	3846.2 kg/ha	64.1 g

Harvesting starts at the age of 4 weeks after planting (WAP) by cutting the young branches, 15 cm long. The harvest were carried out three times.

The variable observed were: plant growth (plant height, number of leaves, number of branches, the total length of branches, the diameter of stems, and leaf area). Leaf area was measured in the 5th widest leaf from the shoot at 6 WAP using the gravimetric method. Other variables observed were fresh weight and dry weight of harvest, fresh and dry weight of shoots and roots. The quality components observed were chlorophyll content by spectrophotometry, vitamin C content by iodine titration, and leaf nitrate content monitored by a nitrate meter (LAQUAtwin-NO3-11, HORIBA Scientific).

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Soil Analysis and Organic Fertilizer

The results of soil analysis of medium planting showed that the soil used had a neutral pH with a value of 7.64, organic and total nitrogen contents were low (1.94%), while the C/N ratio is considered moderate (0.13). The available range of P_2O_5 was 68.10 mg/g, P_2O_5 potential, and K_2O potential very high with values of 159.23 mg/100g and 117.53 mg/100g, respectively.The soil criteria refer to Eviati and Sulaeman (2009) [17].

Analysis of organic fertilizers showed that Mexican sunflower compost contained N of 2.69%, P_2O_5 0.99%, and K_2O 4.96%. The products are relatively low compared to the previous study [18] that N content of Mexican sunflower compost is 3.90%, and Lestari [14] that Mexican sunflower contains 3.50-4.00% N, 0.35- 0.38% P, 3.50-4.10% K. The total N content in compost has decreased because composting for 25-30 days with materials that have a high N content [19].

3.1.2 Growth and Production of Basil Plants Basil

The Kadudampit 2 accession plant height was higher than the other accessions, but not significantly different from the Ciaruteun and Gasol accessions. Kemang accessions had no significant difference in leaf numbers with Gegerbitung, Kadudampit 2, and Cijujug, but significantly larger than other accessions. The number of shoots of ‘Kadudampit 1’ was higher than other accessions, but not significantly different from the ‘Gegerbitung’ and ‘Kemang’. The diameter of ‘Gasol’ was larger than the other accessions, but not significantly different from ‘Kadudampit2’ basil. The leaf area of ‘Gasol’ was larger than the other accessions but not significantly different from the Ciaruteun (Table 2).

Table 2. Plant height, number of leaves, number of shoots, the total length of shoots, stem diameter, and leaf area of basil plants

Treatment	Plant height	Number of leaves	Number of shoots	The total length of shoots	Stem diameter	Leaf area
Accession	**(cm)**	**(strands)**	**(shoots)**	**(cm)**	**(mm)**	**(cm2)**
Gegerbitung	20:31^{a}	119.64^{d}	11.50^{bc}	95.27	4:45^{a}	22.92^{a}
Kadudampit 1	24.14^{b}	99.25^{bc}	12.42^{c}	105.55	5:03^{ab}	35.17^{c}
Kadudampit 2	29.47^{c}	113.93^{cd}	10.87^{ab}	103.15	5.73^{bc}	31.56^{bc}
Kemang	23:17^{b}	120.55^{d}	11.25^{bc}	93.05	4.64^{a}	27.85^{ab}
Ciaruteun	27.20^{c}	97.56^{b}	11.56^{bc}	93.31	5:27^{ab}	45.03^{d}
Cijujug	22.75^{b}	112.15^{bcd}	10.61^{ab}	98.12	4.85^{ab}	29.41^{abc}
Gasol	27.85^{c}	79.12^{a}	9.75^{a}	81.17	6:29^{c}	48.14^{d}
Fertilizer Composition						
100% Ua	27.36^{b}	113.96	11:49	104.95^{bc}	5:17	39.71^{b}
100% MSC	27.10^{b}	103.52	10:46	92.95^{b}	5:17	39.03^{b}
75%Ua+25% MSC	25.89^{b}	109.76	12:21	111.20^{c}	5.63	35.48^{b}
50%Ua+50% MSC	26.66^{b}	105.92	10.90	103.55^{bc}	5:06	35.85^{b}
25%Ua+75% MSC	25.58^{b}	108.54	10.67	94.14^{b}	4.93	34.60^{b}
0% Ua + 0%MSC	17.32^{a}	94.47	11.12	67.1 8^{a}	5.12	21.11^{a}

Means along the column with the same superscript are not significantly different by DMRT (p=0.05)
Ua: urea, MSC: Mexican sunflower compost

Plant height, the total length of shoots, and leaf area of basil plants given various compositions of Mexican sunflower fertilizers were not significantly different from those shown Urea 100%, but more significant than non fertlilized N. The number of leaves, number of shoots, and stem diameter were not significantly different among the various N fertilizer compositions (Table 2).

The fresh and dry weight of Gasol accession was not significantly different from that of Kadudampit2. The fresh and dry weight of Kadudampit 2 accession roots The fresh weight of the ‘Kadudampit 2’ canopy was heavier than ‘Kemang’ and ‘Cijujug’, while the canopy dry weight did not differ between accessions (Table 3).

Table 3. Fresh and dry weight of harvesting, shoots, and roots of basil plants

Treatment	Harvesting weight (g)		Root weight (g)		Canopy weight (g)	
	Fresh	dry	fresh	Dry	Fresh	Dry
Accession						
Gegerbitung	47.02[ab]	6.09[a]	9.36[a]	3.63[ab]	131.60[bc]	32.44
Kadudampit 1	51.45[bcd]	6.37[a]	6.70[a]	2.78[a]	114.54[abc]	29.61
Kadudampit 2	55.94[de]	7:46[b]	13:40[b]	4.82[b]	168.12[c]	40.24
Kemang	44.04[a]	6:10[a]	7:08[a]	2.76[a]	76.97[a]	23:39
Ciaruteun	53.57[cd]	6.68[ab]	8:56[a]	3:16[a]	135.57[abc]	31.16
Cijujug	48.79[abc]	6:59[ab]	7.71[a]	3.08[a]	101.25[ab]	27.88
Gasol	60.21[e]	7.38[b]	8.69[a]	3.31[a]	125.38[abc]	29.99
Fertilizer composition						
100% Ua	56.58[c]	7.40[c]	9.39	3.41[abc]	117.69[b]	30.52[bc]
100% MSC	54.83[bc]	7.16[bc]	8.48	3.16[ab]	118.31[b]	26.02[b]
75% Ua + 25% MSC	53.60[bc]	6.95[bc]	10.78	4.36[c]	192.45[c]	44.36[d]
50% Ua + 50% MSC	51.37[b]	6.80[bc]	8.42	3.48[bc]	122.33[b]	34.53[cd]
25% Ua + 75% MSC	50.78[b]	6.51[b]	8.74	3.21[ab]	104.67[ab]	30.83[bc]
0% Ua + 0% MSC	42.30[a]	5.18[a]	7.18	2.54[a]	76.05[a]	17.76[a]

Means along the column with the same superscript are not significantly different by DMRT (p=0.05)
Ua: urea, MSC: Mexican sunflower compost

The fresh and dry weight of harvest, roots, and canopy of plants shown 100% MSC was not significantly different from those given 100% Urea, as well as those given composition of 75% Urea + 25% MSC, even fresh and dry weight . The canopy of plants given this fertilizer composition more significant than those shown 100% Urea.

3.1.3 Quality of Basil Leaves

The quality of basil leaves (content of nitrate and vitamin C) were significantly influenced by fertilizer's composition. Plants treated with 100% Urea showed the highest nitrate content, not substantially different from those given 25% Urea + 75% MSC, in comparison, plants treated with 100% MSC and not N fertilization showd the lowest nitrate content (Table 5). The content of vitamin C in N fertilizers' various compositions was not significantly different, but substantially higher than plant without N fertilizer (Table 4).

The pigment content of chlorophyll a, chlorophyll b, carotene, and total chlorophyll was significantly affected by accession treatment and fertilizer composition, while anthocyanin content was not affected. Basil leaves of 'Kemang' contain chlorophyll a, chlorophyll b, total chlorophyll, and carotene higher compared to Gasol and Kadudampit1. Basil plants treated with 100% Urea fertilizer composition show the highest content of chlorophyll a, chlorophyll b, total chlorophyll, and carotene, followed by the composition of a mixture of Urea + MSC, while the plants treated with 100% MSC and those not given N fertilizers had the lowest pigment content (Table 5).

Table 4. The content of nitrates and vitamin C of basil leaves

Treatment of	Nitrate	Vitamin C
Accession		
Gegerbitung	94.52	1818.50
Kadudampit 1	1755.50	94.52
Kadudampit 2	1883.30	88.30
Kemang	92.74	1740.70
Ciaruteun	2079.60	87.70
Cijujug	96.30	1649.20
Gasol	99.56	1888.80
Fertilizer Composition		
100% Ua	2373.0[c]	99.80[b]
100% MSC	1358.0[a]	96.76[b]
75% Ua + 25% MSC	1957.1[b]	97.02[b]
50% Ua + 50% MSC	1888.8[b]	94.73[b]
25% Ua + 75% MSC	2073.0[bc]	94.98[b]
0% Ua + 0% MSC	1334.9[a]	76.95[a]

Means along the column with the same superscript are not significantly different by DMRT (p=0.05)
Ua: urea, MSC: Mexican sunflower compost

Table 5. Content Pigment of basil plants

Treatment	Leaf pigment content (mg.g^{-1})				
	Chlorophyll a	Chlorophyll b	Anthocyanin	Carotenoids	Chlorophyll Total
Accession					
Gegerbitung	1.62^{cd}	0.84^{c}	0.04	0.48^{bc}	2.45^{c}
Kadudampit I	1.51^{bc}	0.77^{bc}	0.05	0.42^{ab}	2.28^{bc}
Kadudampit II	1.67^{cd}	0.83^{c}	0.02	0.48^{bc}	2.50^{c}
Kemang	1.75^{d}	0.87^{c}	0.04	0.49^{c}	2.62^{c}
Ciaruteun	1.33^{ab}	0.68^{ab}	0.04	0.40^{a}	2.01^{ab}
Cijujug	1.63^{cd}	0.83^{c}	0.08	0.43^{abc}	2.46^{c}
Gasol	1.27^{a}	0.63^{a}	0.01	0.38^{a}	1.90^{a}
Fertilizer composition					
100% Ua	1.92^{c}	0.95^{c}	0.04	0.52^{c}	2.88^{c}
100% MSC	1.23^{a}	0.63^{a}	0.08	0.35^{a}	1.88^{a}
75% Ua + 25% MSC	1.62^{b}	0.84^{b}	0.05	0.48^{bc}	2.46^{b}
50% Ua + 50% MSC	1.55^{b}	0.78^{b}	0.03	0.44^{b}	2.33^{b}
25% Ua + 75% MSC	1.62^{b}	0.83^{b}	0.02	0.48^{bc}	2.45^{b}
0% Ua + 0% MSC	1.27^{a}	0.64^{a}	0.02	0.37^{a}	1.91^{a}

Means along the column with the same superscript are not significantly different by DMRT (p=0.05)

3.2 DISCUSSION

3.2.1 Growth and Production of Basil Plants

Basil accessions in this study can be distinguished on small leaves (Gegerbitung, Kemang, and Cijujug) and broad leaves (Kadudampit1, Kadudampit2 Ciaruteun, and Gasol). Accessions of broad-leaves basil had significantly higher yields on the variables of plant height, stem diameter, and leaf area. Still, they had the lower number of leaves, the number of the shoot, and the total length of shoots compared to accessions with small leaves, except for Kadudampit2 accession because Kadudampit2 accession began to appear leafy width at 4 WAP. This related to translocation of photosynthate to the part of plant growth [20]. The photosynthate of broadleaf basil accession is allocated more to leaf size than to the number of leaves, the number of shoots, and total length of shoots.

Basil is a leafy vegetable, so the number of leaves, the number and the length of shoots affect the productivity of the basil plant. The 'Gasol' harvest fresh weight was significantly higher than other accessions, because 'Gasol' had the largest leaf size compared to different accessions. Plant with broad leaves will be able to absorb more sunlight, thus increasing photosynthetic rate, and affecting plant growth [21]. This following Gigir *et al.* (2014) [22], which states that the taller the plant, the longer and broader the leaves, the greater the yield.

Plants treated with N fertilizers showed better growth and production responses than those not fertilized. The results of Damayanti's (2017) [23] research show that nitrogen application has a significant effect on the height of the basil plant. According to Aziz and Kurnia (2015), sufficient nitrogen supply to plants can accelerate plant vegetative growth, both on stems, branches, and leaves. The growth and production of basil plants treated of MSC or combined with Urea were not significantly different. This results showed that MSC can substitute or complement for Urea. This related to the ability of MSC to improve soil physical and chemical properties. Mexican sunflower green manure can change the physical properties (reduce the soil density) and chemical properties (increase the content of C-organic, N-total, available-P and K interchangeable) soil, and increase the fresh weight of cabbage flowers [24].

The provision of inorganic fertilizers combined with organic fertilizers can respond to increased growth of basil plants [22]. Sulaeman *et al.* [25] also showed that the application of organic fertilizers (manure or sludge) combined with synthetic fertilizers resulted in higher plant growth and higher maize plant residues. Kurnia *et al.* [26] reported that the production of tomato plants given 30 ton.ha^{-1}grass compost and 15 ton.ha^{-1} grass compost + 50% synthetic fertilizer dose was higher than control.

Basil plants treated without N fertilizer (0% Ua + 0% MSC) showed the lowest growth and production compared to other treatments. This related to the low nitrogen content of the soil used for research, namely 0.13%, so it requires additional elements in the form of fertilizer.

3.2.2 Quality of Treated Basil Plants

Plant leaves that fertilized by 100% Urea, showed the highest nitrate content. This following reported of Liu *et al.* [27] that lettuce treated with inorganic fertilizers had a higher nitrate concentration reaching 5000-6100 mg/kg, when compared to organic fertilizer lettuce, namely 4300-5200 mg/kg. This because the Urea used will immediately hydrolyze and undergo a nitrification process to form NH_4^+ and NO_3^-ions .

Nitrate and nitrite levels in vegetables can vary due to the use of fertilizers and biotic, and abiotic factors. Continuous use of inorganic fertilizers will accumulate in the soil so that nitrate levels will increase and vegetables tend to have high nitrate levels. . These condition needs to be watched out because the estimated total average intake of nitrate consumed is around 61 mg/person/day (range 24-102 mg/person/day), and vegetables contribute around 75% [28].

The application of MSC makes the nitrate content in basil leaves low. This one of the advantages of MSC because vegetables with low nitrate levels are safer for human consumption. Plants treated with various composition of Urea show a higher content of vitamin C compared to non-fertilized. Presumably this is caused by nitrogen from the composition of the fertilizers relatively sufficient for formation of leaf chlorophyll, thus contributing to increasing the rate of photosynthesis. Plants used photosynthate in the form of glucose ($C_6H_{12}O_6$) as a precursor for the formation of vitamin C and other chemical compounds [29].

The mainstay of treatment compared to other treatments. Presumably this condition related to time offering MSC, which is only done once a week before planting, while Urea is given gradually as essential fertilizer, at the ageof 3 and 6 weeks after planting.

The total chlorophyll a and b content in this study were relatively low, about 1.90 - 2.88. Basil has a low range because it is an annual plant. The leaves are small with thin leaves. This is following to Fahn (1982) [30], which states that leaves basil are only composed of one palisade tissue layers. Mesophyll, especially palisade tissue, is anetwork that is rich in chlorophyll.

Chlorophyll and carotene pigments are located in chloroplasts and play a role in the photosynthesis process. Carotene can protect chlorophyll from high light intensity [31]. The results showed that there was a link between carotene and chlorophyll. Raisawati (2018) [32] showed a correlation between the two; an increase in carotene levels related to an increase in chlorophyll levels.

4. CONCLUSION

Kadudampit2 and Gasol accessions can be developed because they show plant height, fresh weight, and dry weight greater than other accessions. The application of MSC and its combination with Urea showed growth, production and quality equivalent to those treated with Urea. MSC can reduce the nitrate levels absorbed by plants, making it safer to consumed and can improve soil fertility. The treatment of 75% N-Urea and 25% N- Mexican sunflower can be an alternative fertilizer that can be used for basil plants because it can balance several aspects both in terms of productivity, economy, and environment.

ACKNOWLEDGMENTS

Thank you to the Directorate General of Higher Education, Ministry of Education and Culture of the Republic of Indonesia for research funding assistance through the 2019 Higher Education Excellence Applied Research Grant.

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