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Research Article

Study of eban local garlic yield potential using sustainable cultivation technology in the North Central Timor District

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Abstract

This study aims to determine the effect of the best types of mulch and organic fertilizer on the growth and yield of local Eban garlic. This research was conducted from May to October 2022 on the land of the Melati Women Farmer Group (WFG), Salu Village, West Miomaffo District, North Central Timor Regency, East Nusa Tenggara, and the Laboratory of the Faculty of Agriculture, University of Timor. The experimental design used was a spit-plot design with three replications. The treatment consists of two factors: The first factor is the use of mulch, which consists of three levels, namely: TO = without mulch; T1 = organic mulch (rice straw mulch); and T2 = inorganic mulch (plastic mulch). The second factor was the use of cow manure, consisting of four levels, namely: P0 = no fertilizer (without treatment), P1 = cow manure (20 t/ha) + rice husk biochar, P2 = cow manure (20 t/ha) + biochar compost, and P3 = cow manure (20 t/ha) + biochar compost tea. The treatment combinations were T0P0, T0P1, T0P2, T0P3, T1P0, T1P1, T1P2, T1P3, T2P0, T2P1, T2P2, and T2P3 with 3 replications, so that 36 units were obtained. The results of the study showed that the combination treatment of straw mulch and cow manure (20 t/ha) plus rice husk biochar gave the best results on the local garlic yield index parameter eban (9.92).

Introduction

Garlic (Allium sativum L.) is a root vegetable that is widely grown in various countries around the world. In Indonesia, garlic has many nicknames; the people of Manado call it lasuna moputi, the people of Makasar call it lasuna kebo, and the Javanese call it bawang (Wibowo, 2007). North Central Timor Regency has a local garlic cultivar that is commonly cultivated by the community. Local Eban garlic in the North Central Timor district, known as Peo Aij, is quite common in West Miomaffo District, North Central Timor (TTU) district. Garlic production in West Miomaffo District, North Central Timor Regency, fluctuates greatly every year, based on the data obtained for the last 3 years, namely: in 2014, it produced 8 tons of garlic; in 2015, it produced 14 tons; and in 2016, it produced 5.6 tons [1]. However, the results obtained at the time of harvest are still far below expectations. One of the reasons is that the method of cultivating plants is still not optimal and does not use good technology. Technology in cultivation affects the growth and yield of garlic plants [2]. Local garlic grown by the community is a type that has been planted for generations. Minimal processing of land and lack of fertilization cause results that are not optimal. The growth of wild garlic is correlated with the physicochemical properties of the soil, for example, the availability of phosphate and calcium. Similarly, soil mineral concentrations correlate with plant growth and wild garlic bulbs [3]. Local people in North Central Timor Regency usually cultivate without tillage and do direct planting, which causes low growth and yield. The aim of Knowing the effect of various types of mulch and the composition of biochar in compost as a basic fertilizer ingredient and as a basic ingredient for compost tea application on the optimal growth and yield of garlic (Allium sativum L.). Many studies have proven that the use of mulch and organic fertilizers can increase the growth and yield of garlic plants. Cropping system has a significant effect on garlic growth, yield, and yield-increasing properties [4]. Tillage, mulching, and fertilizer application are ways to increase the growth and yield of garlic plants. There are

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prospects for the practical application of catchment crops in the form of mulch for garlic cultivation to increase nutrient levels without compromising yields [5]. The use of mulch can help reduce evaporation in this microenvironment so that moisture is maintained. Garlic plants intercropped with chicory mulch produced higher leaf and tuber weights compared to plantings without cover crops [6]. Soil is formed by living plants interacting with microorganisms, plant residues, and the remains of microorganisms after they die. Cultivation, not plants, depletes the soil of nutrients. Plowing and cultivation of any kind reduce the natural fertility of the soil. Minerals and trace elements, although present in the soil, may be inaccessible to plants due to the absence of microorganisms (killed by tillage, pollution, herbicides, or pesticides) that participate in the process of plant mineral nutrition. Just as the microflora in our own digestive systems is necessary for our bodies to absorb and use nutrients from digested food, microorganisms in the soil perform the same function for plants [7]. The addition of organic fertilizer is a way to increase soil fertility. Of the soil properties, garlic yield was highly positively correlated with soil N concentration, indicating that the application of different doses of leopardine or a mixture of leopardine with mineral fertilizers resulted in higher soil N concentrations and thus had the greatest effect on garlic yield [8].

The use of cow manure is a technology package that is able to improve the soil environment so as to provide a supply of macro- and micronutrients and even growth hormones from the auxin group, cytokinins, which can improve soil fertility and increase crop production. Rice husk biochar is black charcoal that is applied to the soil and is useful in adding soil organic matter. Rice husk biochar can improve soil conditions and increase crop production, especially in infertile soils. The ability of biochar to hold water and nutrients in the soil helps prevent fertilizer loss due to runoff and leaching, thus enabling fertilizer savings and reducing pollution to the surrounding environment (BPTP, 2011). Biochar compost is an organic fertilizer that contains many nutrients that are beneficial to plants and soil ecosystems. Compost can improve soil fertility and increase plant resistance to pathogens through the microbial activity contained therein. In addition, compost has a high nutrient capacity and can produce antibacterial compounds that are predatory or parasitic, so that plant resistance to disease-causing disorders can be increased [9]. Compost can be fermented and then extracted into compost tea, the residue of which is used in this study. Compost tea is a natural household fertilizer product that can function as a natural pesticide because it is able to restore soil fertility naturally and increase plant resistance to pests and diseases. Compost tea contains more than 5,000,000 microorganisms that have the potential to increase soil fertility, nourish plants, and reduce damage caused by soil-borne pathogens and disease-causing pathogens on plant leaves [10].

Materials and methods

This research was conducted from May to October 2022 on the land of the Melati Women Farmer Group (WFG), Salu Village, West Miomaffo District, North Central Timor Regency, East Nusa Tenggara, and the Laboratory of the Faculty of Agriculture, University of Timor. The tools used in this study were cultivators, hoes, machetes, analytical scales, measuring cups, calipers, rulers, chimneys, gembor, jerry cans, sacks, and hammers. The materials used are local Eban garlic bulb seeds, silver black plastic mulch and rice straw mulch, rice husks, chopped leaves, water, molasses, and cow manure. The experimental design used was a spit-plot design with three replications. The treatment consists of two factors: The main factors consist of To (without mulch), T1: straw mulch, and T2: plastic mulch. The second factor included P1: no fertilizer (no treatment); P2: cow manure (20 t/ha) + rice husk biochar; P3: goat manure (20 t/ha) + rice husk biochar; P4: cow manure (20 t/ha) + biochar compost; P5: goat manure (20 t/ha) + biochar compost; P6: cow manure (20 t/ha) + biochar compost tea; and P7: goat manure (20 t/ha) + biochar compost tea. Other observations include Soil pH, plant height, number of leaves, root length, root volume, tuber diameter, number of cloves, tuber weight per plant, and harvest index. The data were analyzed using analysis of variance with α = 5%, followed by The follow-up test in the form of Duncan's multiple-area test or DMRT (Duncan's Multiple Range Test) is a comparison between the two averages of all existing average values.

Results and discussions

Soil pH

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on soil pH. In addition, there is no interaction between organic fertilizers and mulch on soil pH parameters Table 1.

The data above show that there was no significant difference between treatments; the highest soil pH was in treatment (5.00), and the lowest soil pH was in treatment (4.83). This shows that various types of organic fertilizer and mulch treatments have no effect on soil pH. Differences in soil pH, apart from being influenced by the type of organic fertilizer used, are also related to the use of mulch. The type of mulch significantly affects soil properties, with mulch being associated with increased soil moisture, organic matter, and other soil chemical and biological properties relative to paper mulch [11].

Plant height

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on plant height. Moreover, there is no interaction between organic fertilizers and mulch on plant height parameters Table 2.

Table 1: Soil pH.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	5,00 a	4,83 a	5,00 a	5,00 a	4,83 a	4,83 a	5,00 a
T1	4,83 a	4,83 a	5,00 a	5,00 a	4,83 a	4,83 a	4,66 a
T2	4,83 a	4,83 a	4,83 a	5,00 a	5,00 a	5,00 a	5,00 a

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's advanced test at the level of α = 5%

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The data above shows that there was no significant difference between treatments; the highest plant height was in the treatment of cow manure (20 t/ha) plus rice husk biochar T0P2 (44.70); the lowest plant height was in the treatment of plastic mulch and goat manure (20 t/ha) plus rice husk biochar T2P3 (34.16). The differences in treatment lead to differences in the availability of nutrients in the soil as well as nutrient intake for the growth of garlic plants. Organic fertilizer application can affect plant growth [12].

Number of leaves

The results of the data analysis showed that the application of organic fertilizers had no significant effect on the number of leaves. However, the mulch treatment had a significant effect on the number of leaves. There is no interaction between fertilizer and mulch on the number of leaves in the number of leaves parameter Table 3.

The data above shows that there is a significant difference between treatments: the highest number of leaves was in the treatment of cow manure at 20 t/ha plus rice husk biochar T0P2 (7.22), and the lowest number of leaves was in the treatment of plastic mulch and goat manure at 20 t/ha plus biochar rice husk T2P3 (4.67). Differences in nutrient content caused by differences in fertilizer treatment lead to differences in nutrient content in the soil. It is suspected that the difference in the C/N ratio of organic fertilizers causes differences in the speed of the decomposition process of organic matter. There is a difference between cow and goat manure in crop yields [13]. The use of plastic mulch on the basis of the number of leaves shows less than optimal results; it is suspected that the soil moisture is low compared to without mulch, so the nutrients in the soil are not optimal. This is because the research was conducted in the summer, so the effect of plastic mulch causes the temperature of the soil to rise. Unstable soil temperatures can interfere with microorganisms, accelerating the decomposition of organic matter in the soil.

Root length

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on root length. Moreover, there is no interaction between organic fertilizer and mulch on the root length parameter Table 4.

The data above shows a significant difference between treatments: the highest root length was in the treatment of cow manure 20 t/ha plus biochar compost tea T0P5 (10.07); the lowest root length was in the treatment of plastic mulch and cow manure 20 t/ha plus biochar compost tea T2P6 (6.17). This is presumably because mulch affects the temperature in the soil and the hot season at the time of the study disrupted the decomposition of organic matter in the soil. Biochar compost is thought to affect the availability of nutrients in the soil, which causes different root lengths. Context of microbial mechanisms underlying the effect of biochar on the soil C cycle and assimilation of the C and N cycles after soil biochar amendment [14].

Table 2: Plant Height 12 WAP.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	39,61 abc	44,70 a	44,54 a	36,18 abc	42,22 abc	40,67 abc	40,43 abc
T1	40,22 abc	42,58 abc	40,6 abc	42,7 Abc	43,57 abc	42,73 abc	43,36 abc
T2	35,96 abc	42,71 abc	34,16 c	37,78 abc	38,3 abc	34,97 bc	34,63 bc

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Table 3: Number of Leaves.

Mulch Treatment	Fertilizer Treatments						
	P1	P2	P3	P4	P5	P6	P7
T0	5,78 abc	7,22 a	6,67 ab	5,33 bc	6,56 ab	6,89 ab	6,33 abc
T1	5,78 abc	6,22 abc	5,67 abc	5,89 abc	6,33 abc	6,78 ab	5,67 abc
T2	5,22 bc	6,89 ab	4,67 c	5,56 abc	5,56 abc	5,00 bc	5,11 bc

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Table 4: Root Length.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	8,08 abcd	9,03 abc	8,45 abcd	7,03 bcd	10,07 a	9,12 abc	8,26 abcd
T1	7,93 abcd	7,66 abcd	8,41 abcd	6,68 cd	8,57 abcd	7,2 bcd	7,55 abcd
T2	7,26 bcd	9,44 a	6,27 d	8,44 abcd	6,92 bcd	6,17 d	6,54 cd

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Root volume

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on root volume. Moreover, there is no interaction between the type of mulch and organic fertilizer on the root volume parameter Table 5.

The data above shows a significant difference between the types of mulch and organic fertilizer treatments. The highest root volume was in the 20 t/ha cow manure + biochar compost T0P2 (1.95) and the lowest root volume was in the 20 t/ha plastic mulch and goat manure treatments + rice husk biochar T2P3 (0.56). The difference in root volume between treatments was due to the different nutrients in the soil. This is largely due to the differences in the ratios of total N, total P, C/N, and C/P of the amendments [15]. This difference is thought to be due to the treatment of different types of organic fertilizers.

Tuber diameter

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on tuber diameter. Moreover, there was no interaction between organic fertilizers and mulch on the tuber diameter parameter Table 6.

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The data above shows that there is a significant difference between treatments, with the highest diameter in the treatment of 20 t/ha cow manure + biochar rice husk T0P2 (2.82), and the lowest tuber diameter in the treatment of plastic mulch and goat manure + biochar compost tea T2P6 (2.04). Treatment with various types of mulch had no effect on tuber diameter [16]. Thus, it is suspected that the different organic fertilizer treatments lead to different nutrient availability in the soil, so the organic cow manure treatment, based on the yield of tuber diameter, gives higher yields than the other treatments.

Number of cloves

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on the number of cloves. Moreover, there is no interaction between organic fertilizers and mulch on the number of cloves parameter Table 7.

The data above show that the treatment of various types of mulch and fertilizer is significantly different between treatments, with the highest number of cloves in the cow manure treatment (20 t/ha + rice husk biochar) T0P2 (14.67) and the lowest number of cloves in the plastic mulch and goat manure treatment (20 t/ha + tea biochar compost) T2P6 (6.55). The difference in fluff is caused by the type of fertilizer treatment. The application of 20 t/ha cow manure had an effect on tuber weight and the amount of leaching [17].

Tuber weight per plant

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on tuber weight per plant. Moreover, there is no interaction between organic fertilizers and mulch on the number of tuber weights per plant parameter Table 8.

The above data shows a significant difference between the mulch and organic fertilizer treatments, with the highest tuber weight in the 20 t/ha cow manure + rice husk biochar treatment T0P2(11.26) and the lowest tuber diameter in the 20 t plastic mulch and goat manure treatment (20 t/ha + biochar compost tea) T2P7 (3.35). The difference in fluff is caused by the type of fertilizer treatment. The application of 20 t/ha cow manure had an effect on tuber weight and the amount of leaching [17].

Harvest index

The results of the data analysis showed that the application of organic fertilizers and mulch had no significant effect on the number of cloves. Moreover, there is no interaction between organic fertilizers and mulch on the harvest index parameter Table 9.

The data above show that there is a significant difference between the treatments with mulch and organic fertilizer on the harvest index, with the highest harvest index in the treatment of plastic mulch and cow manure (20 t/ha) plus rice husk biochar T2P2 (9.92) and the lowest harvest index in the treatment without mulch and no fertilizer T0P1 (5.77). The use of plastic mulch has good results for planting chilies out of season [18]. In addition, cow manure (20 t/ha) and rice husk biochar increase the nutrients in the soil. Biochar and manure increase soil surface organic C and total N content [19]. From

Table 5: Root Volume.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	0,98 b	1,95 a	0,94 b	0,70 b	1,15 ab	1,17 ab	1,16 ab
T1	0,94 b	1,05 b	1,01 b	0,77 b	0,94 b	0,67 b	0,74 b
T2	0,48 b	1,35 ab	0,56 b	0,76 b	0,93 b	0,63 b	0,61 b

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Table 6: Tubers Diameter.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	2,19 abc	2,82 a	2,60 ab	2,23 abc	2,44 abc	2,45 abc	2,43 abc
T1	2,38 abc	2,74 a	2,48 ab	2,63 ab	2,67 ab	2,63 ab	2,26 abc
T2	2,35 abc	2,73 ab	2,04 bc	2,35 abc	2,41 abc	2,04 bc	1,78 c

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Table 7: Number of Cloves.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	10,00 abcd	14,67 a	13,88 ab	10,44 abcd	12,11 abc	14,00 ab	12,55 abc
T1	8,33 abcd	10,33 abcd	9,00 abcd	11,00 abcd	10,44 abcd	11,11 abcd	8,78 abcd
T2	8,00 bcd	11,55 abc	7,22 cd	10,11 abcd	9,33 abcd	6,55 cd	4,88 d

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%.

Table 8: Tuber weight per plant.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	5,84 bcd	11,16 a	8,34 abcd	5,89 bcd	7,37 abcd	7,48 abcd	7,06 abcd
T1	8,02 abcd	9,27 abc	6,60 abcd	8,53 abcd	8,31 abcd	8,64 abc	7,45 abcd
T2	5,60 bcd	10,18 ab	4,21 cd	6,11 abcd	5,98 abcd	4,28 cd	3,35d

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%

Table 9: Harvest Index.

Mulch Treatment	Fertilizer Treatment						
	P1	P2	P3	P4	P5	P6	P7
T0	5,77 c	9,88 a	7,67 abc	7,55 abc	6,49 abc	7,65 abc	7,33 abc
T1	7,27 abc	8,91 abc	9,33 abc	9,81 a	8,03 abc	7,99 abc	7,28 abc
T2	9,57 ab	9,92 a	5,82 c	6,96 abc	6,94 abc	8,51 abc	5,98 bc

Note: The numbers followed by the same letter in the same column are not significantly different based on Duncan's further test at the level of α = 5%

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the results of this study, it was suspected that the availability of N nutrients in the soil provided by 20 t/ha cow manure plus rice husk biochar increased the harvest index of garlic plants.

Conclusion

The results showed that there was no interaction between treatments of various types of mulch and organic fertilizers on the growth and yield of local Eban garlic plants, but there were significant differences in each growth and yield parameter, including plant height, number of leaves, root length, root volume, tuber diameter, number of uses, tuber weight per plant, and harvest index. Based on the harvest index parameters, the treatment of plastic mulch and cow manure (20 t/ha) plus rice husk biochar had the highest harvest index of 9.92.

Suggestion

Further research needs to be carried out for each growing season to find out more about the growth and yield of local eban garlic plants.

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References

1. Central Bureau of Statistics (2017) Harvested Area, Production and Productivity of Garlic in Indonesia. BPS.

2. Rahayu ST, Basuki RS, Levianny PS. Pengaruh varietas dan aplikasi teknologi budi daya terhadap kualitas umbi bawang putih. Widyariset. 2020; 6(2). doi: 10.14203/widyariset.6.2.2020.88-98.

3. Jeong MJ, Song HJ, Kim HG, Park DJ, Yong SH. The optimal cultivation conditions for wild garlic (Allium victorialis var. Platyphyllum) under the forests as a non-timber forest product (NTFP). Agrofor Syst. 2020; 94(3). doi: 10.1007/s10457-019-00447-8.

4. Rahman MM, Hossain M, Rahman MH, Rahim MA, Islam MT. Growth and yield performance of garlic varieties under zero-tillage and tillage system. Int J Hortic Sci. 2020; 26.

5. Sałata A, Pandino G, Buczkowska H, Lombardo S. Influence of catch crops on yield and chemical composition of winter garlic grown for bunch harvesting. Agric. 2020; 10(4). doi: 10.3390/agriculture10040134.

6. Sałata A, Moreno-Ramon H, Ibáñez-Asensio S, Buczkowska H, Nurzyńska-Wierdak R. Possibilities to improve soil physical properties in garlic cultivation with cover crops as living mulches. Acta Sci Pol Hortorum Cultus. 2017; 16(6). doi: 10.24326/asphc.2017.6.14.

7. Alessio M. Synergistic agriculture. Eur J Integr Med. 2012; 4. doi: 10.1016/j.eujim.2012.07.908.

8. Sarıyıldız T. Effects of Leonardite and Mineral Fertilizer Applications on Plant Growth and Soil Quality of Garlic (Allium sativum L.). Turkish J Agric Food Sci Technol. 2020; 8(8): 1763–1772. doi: 10.24925/turjaf.v8i8.1763-1772.3504.

9. St. Martin CCG. Enhancing Soil Suppressiveness Using Compost and Compost Tea BT - Organic Amendments and Soil Suppressiveness in Plant Disease Management. In: Meghvansi MK, Varma A. editors. Springer International Publishing, Cham. 2020; 25-49.

10. Litterick AM, Harrier L, Wallace P, Watson CA, Wood M. The role of uncomposted materials, composts, manures, and compost extracts in reducing pest and disease incidence and severity in sustainable temperate agricultural and horticultural crop production—a review. Critical reviews in plant sciences. 2004; 23(6): 453-479.

11. Larkin RP. Effects of selected soil amendments and mulch type on soil properties and productivity in organic vegetable production. Agronomy. 2020; 10(6).

12. Mahmood YA, Mohammed IQ, Ahmed FW. Effect of organic fertilizer and foliar application with garlic extract, whey and bio fertilizer of bread yeast in availability of NPK in soil and plant, growth and yield of tomato (Lycopersicon esculentum mill). Plant Arch. 2020; 20.

13. Nurcahya, A.O., N. Herlina, and B. Guritno. 2017. The Effect of Types of Organic Fertilizers and Application Time on the Growth and Yield of Sweet Corn (Zea mays saccharata Sturt). J. Produksi Tanam. 5(9): 1476-1482.

14. Prayogo C, Jones JE, Baeyens J, Bending GD. Impact of biochar on mineralisation of C and N from soil and willow litter and its relationship with microbial community biomass and structure. Biol Fertil Soils. 2014; 50(4). doi: 10.1007/s00374-013-0884-5.

15. Maerere A, Kimbi G, Nonga D. Comparative effectiveness of animal manures on soil chemical properties, yield and root growth of amaranthus (amaranthus cruentus l.). African J Sci Technol. 2009; 1(4). doi: 10.4314/ajst.v1i4.44623.

16. Jamil M, Munir M, Qasim M, Baloch J, Rehman K. Effect of different types of mulches and their duration on the growth and yield of Garlic (Allium sativum L.). Int J Agri Bio. 2005; 7(4).

17. Astuti AAR, Nuraini Y, Baswarsiati B. Utilization of trichocompos and cow stage for improving soil chemical properties, growth and production of garlic (Allium sativum L.). J Land and Resources Land. 2022; 9(2): 243-253. doi: 10.21776/ub.jtsl.2022.009.2.5.

18. Darmawan IGP, Nyana IDN. The effect of using plastic mulch on the yield of cayenne pepper (Capsicum frutescens L.) out of season in Kerta Village. J Agroecotechnology. 2014; 3(3): 148–157.

19. Gao S, Duan Y, Wang D, Turini T. No significant influence of biochar and manure application on nitrogen fate and sequestration by tomato and garlic crops: A field experiment in California, USA. Soil Use Manag. 2022; 38(1): 676-690. doi: 10.1111/sum.12749.

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