

RIWAYAT KORESPONDENSI In Research on Crops (Q3)

ISSN:0972-3226

Publisher:Gaurav Society of Agricultural Research Information Centre

<https://www.scopus.com/sourceid/19900191751>

The screenshot shows the Scopus Source details page for 'Research on Crops'. The page includes the Scopus logo, search and navigation options, and a 'Source details' section. The source name is 'Research on Crops', with Scopus coverage years from 2008 to the present. The publisher is 'Gaurav Society of Agricultural Research Information Centre' and the ISSN is '0972-3226'. The subject area is categorized under 'Agricultural and Biological Sciences: Agronomy and Crop Science' and 'Agricultural and Biological Sciences: Soil Science'. The source type is 'Journal'. On the right, performance metrics are listed: CiteScore 2021 (1.7), SJR 2021 (0.272), and SNIP 2021 (1.056). At the bottom, there are links for 'View all documents', 'Set document alert', and 'Save to source list'. The browser's taskbar shows the system time as 7:01 PM on 29-Aug-22.

<https://www.scimagojr.com/journalsearch.php?q=19900191751&tip=sid&clean=0>

The screenshot shows the ScimagoJR journal search results for 'Research on Crops'. The page is titled 'Research on Crops' and displays three main categories: 'COUNTRY', 'SUBJECT AREA AND CATEGORY', and 'PUBLISHER'. Under 'COUNTRY', 'India' is listed with a button for 'Universities and research institutions in India'. Under 'SUBJECT AREA AND CATEGORY', 'Agricultural and Biological Sciences' is listed, with sub-categories 'Agronomy and Crop Science' and 'Soil Science'. Under 'PUBLISHER', 'Gaurav Society of Agricultural Research Information Centre' is listed. The browser's taskbar shows the system time as 7:01 PM on 29-Aug-22.

H-INDEX 15	PUBLICATION TYPE Journals	ISSN 09723226
COVERAGE 2008-2021	INFORMATION Homepage How to publish in this journal croresearch1@gmail.com	

https://indianjournals.com/ijor.aspx?target=ijor:rcr&type=for_authors

The screenshot shows the website for 'Research on Crops' (ROC). The page title is 'ROC Author Guidelines'. It features a navigation bar with links such as 'Home', 'About us', 'My Profile', 'Registration', 'Products', 'Article Submission', 'Usage Statistics', 'Price List 2022', 'Contact Us', 'Tutorial', and 'Login/Register'. A sidebar on the left contains various links including 'Journal Home', 'Current Issue', 'Archive / Issues', 'Registration', 'Subscribe', 'Editorial Board', 'Aims & Scope', 'Author Guidelines', 'Ethics & Malpractice', 'News & Events', 'Subscribe TOC', and 'Alerts'. The main content area is titled 'Manuscripts:' and contains the following text:

The full-length research papers and review articles written in English are welcome for publication in the 'Research on Crops' journal (Print ISSN 0972-3226, Online ISSN 2348-7542). The abbreviated title of the journal is 'Res. Crop'.

Aims and Scope:

The 'Research on Crops' is a peer-reviewed international journal publishing original research on basic and applied aspects of agronomy, soils and crop sciences including agricultural water management, agro-climatology, agroforestry, crop production, crop protection, cropping systems, genetics & plant breeding, horticulture, plant biotechnology, plant nutrition, post-harvest management of crops, seed science, soil management & tillage, vegetables, weed science, agricultural engineering, environmental science, nano-technology, food science and technology, agri-business, agricultural economics, etc.

- The full-length research papers should be typed in one column on A4 size page leaving 2.5 cm margins on all sides. The manuscripts should be typed in MS Word format using Times New Roman 12 pt. font with 1.5 space between lines. Normally, the research papers containing more than 10 typed pages excluding tables and figures are not considered for publication in this journal.
- The tables/figures should not cover more than 30% space of the text.
- The full-length research papers submitted for publication should not contain data older than 3 years on the date of submission.

COVER LETTER

To Research on Crops

Dear Editor,

I would like to send an original article entitled: **“Profitability of Tomato Farming Through the Eco-enzymes Application”** for Research on Crops to consider. I confirm that this work is genuine and has not been published elsewhere, nor is it considered for publication elsewhere. We believe

and hope that this manuscript is worthy of publication by Research on Crops. We are interested in publishing articles in this journal because it has an excellent reputation, so it is a matter of pride if published in Research on Crops. Here I attach the manuscript.

Thank you
Best regards,

Ardiyanta
Universitas PGRI Yogyakarta, Indonesia

Submission of Manuscript: 31 Agustus 2022

Profitability of Tomato Farming Through the Eco-enzymes Application

ARDIYANTA^{1*}, CICILIA TRI KUSUMASTUTI², OKTI PURWANINGSIH³, PAIMAN⁴

^{1,2,3,4}*Department of Agrotechnology, Faculty of Agriculture, Universitas PGRI Yogyakarta,
Yogyakarta 55182, Indonesia*

¹*Address: Jl. PGRI I Sonosewu No. 117 Yogyakarta 55182, Indonesia*

Author email:

¹*ir.ardiyanta@upy.ac.id,*

²*kusumastuti@upy.ac.id,*

³*oktipurwaningsih71@gmail.com,*

⁴*paiman@upy.ac.id*

**Corresponding author: Telp: +628122757813, fax: +62274(376808), email:*

ir.ardiyanta@upy.ac.id

ABSTRACT

Tomatoes are one type of vegetable in great demand by the public, but their production has not been able to meet market demand. Increasing production is always used in chemical fertilizers so that they can damage the chemical properties of the soil and environment. One alternative substitute is the use of organic fertilizer called eco-enzyme. This study aimed to determine the profitability of tomato farming through the eco-enzymes application. This study was arranged in a randomized complete block design (RCBD) with three replications. The co-enzymes dosage

consisted of 0, 150, and 300 L/ha. Each replication consisted of 6 plant samples, so 54 plants are needed. The results showed that the total production cost of tomato farming at a dosage of 0 L/ha was Rp. 30,000,000/ha with a gross income of Rp. 62,780,800/ha and a profit of Rp. 32,780,800/ha. In contrast, the dosage of 150 L/ha needed a total production cost of Rp. 32,650,000/ha, and a gross income of Rp. 67,170,667/ha and was found a profit of Rp. 34,520,667/ha. In the dosage of 300 L/ha, a production cost of Rp. 34,900.00 was required, and a profit was Rp. 37,170,933/ha. Using a co-enzyme dosage of 150 and 300 L/ha can increase profits of Rp. 1,739,867/ha (5.3%) and Rp. 4,390,133/ha (13.4%) compared to 0 L/ha, respectively. Tomato farming in three co-enzym dosages showed a TR/TC ratio of $2.1 > 1$, which is feasible. The research findings that the eco-enzymes application at a dosage of 300 L/ha can increase the higher income of tomato farmers than dosages of 0 and 150 L/ha. We suggest that using eco-enzymes at a dosage higher than 300 L/ha can be done in tomato farming.

Keywords: Cost, dosage, income, production, waste

Running headline: Profitability of tomato farming

INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is an important member of the Solanaceae family. It is mainly used globally as a food and commercial crop (Gatahi, 2020) and as one of Indonesia's horticultural commodities with high economic value. The prospects for the development of tomatoes are up-and-coming. The needs of the market from year to year are continuously increasing. The community needs tomato fruit to complement the spices of dishes so that it can be consumed directly in fresh form or juice.

Farmers are interested in tomato production by cultivating new varieties because tomatoes are short-lived and profitable vegetables (Das and Jahan, 2022). High tomato production depends on using superior varieties, better management, and timely provision of inputs (Parvin, 2017). In Indonesia, tomato production from 2015-2019 increased yearly (Anonymous, 2019). However, chemical fertilizers are often used excessively, increasing production costs and not achieving economic efficiency (El-khalifa *et al.*, 2022). The use of superior varieties and the availability of production facilities will determine the production of tomatoes. However, excessive use of inorganic fertilizers will lead to a deterioration and the environment's physical properties.

Therefore, the use of chemical fertilizers should be reduced. One alternative is the use of eco-enzymes.

The production of eco-enzymes has the dual advantage of reducing the burden on organic waste management and is beneficial in agriculture, animal husbandry, household hygiene, etc. (Kerkar and Salvi, 2021). Eco-enzyme results from the fermentation of organic kitchen waste from fruits and vegetables mixed with brown sugar and water. Applying organic substances through eco-enzymes (fermented organic matter) can increase soil and plant productivity. Therefore, organic matter utilization is one of the environmentally friendly components for plant cultivation. However, how much dosage of eco-enzymes can use to maximize tomato fruit production is still unknown. Therefore, it is necessary to research the use of the optimal eco-enzyme dosage.

Eco-enzymes effectively act as environmentally friendly solutions to reduce the composition of food waste in solid waste landfills and have the potential to be applied to the wastewater industry (Galintin *et al.*, 2021). Waste is the residue or waste from a business or human activity that, if left unchecked, will negatively impact the environment. For example, household waste is commonly found in the skin of fruits and vegetables. But the community does not yet have the awareness to use the waste, even though household waste has the potential to be the basic material for making eco-enzyme. Furthermore, the increasing population increases its activities, producing more waste.

The addition of eco-enzymes increased the availability of nutrients for plants (Nurjaman *et al.*, 2022). The production of liquid organic fertilizers with the main ingredients of agricultural waste significantly affects the content of macronutrients produced (Devianti *et al.*, 2021). Eco-enzymes are made from residues or household waste such as vegetable waste or fruit peels which are widely disposed of by the community. Eco-enzyme in the form of a liquid is dark brown with an intense fruity aroma.

Eco-enzyme is an unexpected composition formed from the fermentation of new kitchen waste, brown sugar, and water (Janarthaan *et al.*, 2020). Eco-enzymes are products produced using raw materials such as peeled fruits and vegetable residues, brown sugar, and water (Kerkar and Salvi, 2021). Eco-enzyme liquid is a product that is easy to use and produce. The manufacture of this product requires only water, sugar as a source of carbon, and organic waste of vegetables and fruits. Eco-enzymes have many benefits, including as a disinfectant and organic fertilizer. According to Eshtiaghi and Nakthong (2020), eco-enzyme can inhibit the growth of microorganisms in wastewater and can treat metal-based effluent.

Eco-enzyme is a liquid fermented from organic waste of fruits, vegetables, and other organic waste, which is very useful for agriculture (Hasanah *et al.*, 2020). Using eco-enzymes increased dry bulb weight by 20.47 compared to control (Hasanah *et al.*, 2022). Eco-enzymes can provide nutrients and improve soil's physical properties, chemical and biological properties, and product quality. Eco-enzymes significantly affected root length and leaves number at a dose of 1.75 ml/L of water on shallots (Novianto, 2022).

The provision of eco-enzymes can increase tomato production and is also expected to increase farm income. According to Duhan (2016), Profit analysis compares total costs and revenues. The difference between total revenue and costs is referred to as total profit. Therefore, profit is the total revenue minus the total costs. However, added research results by Mwatawala *et al.* (2019), several factors that affect profitability are farming experience, land area, and access to market information. Furthermore, organizations or groups must be formed to increase profitability among farmers to facilitate the marketing of tomato products.

The total fixed and variable costs constitute the total cost of production per hectare of crop. Operational costs are costs related to the cost of running a farming business (Kushwaha *et al.*, 2018). Fixed costs (FC) refer to costs that do not vary with the production level, while variable costs (VC) refer to those that vary with production. Total costs (TC) are the sum of total fixed costs (FC) and total variable costs (VC) (Sekumade and Toluwase, 2014).

How much to use the dose of eco-enzymes to get maximum production until now has not been found. The more optimal the production of tomatoes produced, the more it will affect the income of tomato farming. Therefore, this study aimed to determine the profitability of tomato farming through the eco-enzyme application.

MATERIALS AND METHODS

Study area

This research was conducted in Soboman Village, Ngestiharjo, Kasihan, Bantul, Yogyakarta, Indonesia. The study was conducted in January-June 2022. The tools that were used in this study were hoes and digital scales. In addition, the materials of Corona variety tomatoes, Pearl NPK fertilizer, and eco-enzymes were used in this study.

Experimental design

This research was conducted in the field and arranged in a randomized complete block design (RCBD). The dosage of eco-enzyme consisted of three levels: 0, 150, and 300 L/ha. Each treatment was repeated three times (replication as a block). Each replication consisted of six sample plants, so 54 plants were needed.

Research procedures

This study used the soil type regosol. A hoe carries tillage at a depth of 0-20 cm. The soil was loosened, and a sample plot in size of 100 cm (width) × 150 cm (length) and left for two weeks. Tomato seedlings were ground at the age of 14 days after sowing. The seeds were obtained from the Trubus store seed provider in Yogyakarta. Planting was carried out by separating the seedlings from the polybags, then planted into the beds at a plant spacing of 50 cm × 50 cm. Seedlings were planted on an example plot with two rows, and each row consisted of three plants.

Watering was carried out once every two days every morning. The application of eco-enzymes was carried out on tomato plants at 14 days after planting with the appropriate treatment dosage. Pest control of the Whitefly was carried out twice during the study using the Curacron pesticide. Locust control was carried out manually.

Harvesting of tomato fruits was carried out at the age of 60 days after planting. The characteristic of the harvested fruit was that 50% of the fruit was red. Harvesting was carried out seven times during the study, once every four days.

Production Costs and Revenue

The production costs (TC) of tomato farming included fixed costs (FC) and variable costs (VC). Fixed costs (FC) were only for land leases. Variable costs (VC) were labor and infrastructure costs. Labor costs included tillage, planting, embroidery, maintenance, weed and disease control, tide, irrigation, and harvesting. The infrastructure cost included seeds, inorganic fertilizers, ajir stake, pesticides, and eco-enzymes. The gross income (TR) of tomato farming was the multiplication of the price of tomato fruit (P) by the amount of production (Q) at that time. Farm business profits were obtained from $TR - TC$.

Farm profitability and feasibility

To calculate the feasibility of tomato farming using the TR/TC ratio. Tomato farming was feasible if the $TR/TC > 1$. If $TR/TC < 1$, shows that tomato farming was profitable.

RESULTS AND DISCUSSION

Production costs

Land lease

Farmed fixed costs were incurred only for land leases (FC). The cost of renting land was Rp. 4,000,000 per growing season. One growing season was calculated for four months. Tillage until the end of the harvest takes four months. The location of the paddy fields used was technically watered.

Labor Costs

The labor costs of tomato farming included the cost of tillage, planting, embroidery, maintenance, weed and disease control, tide, irrigation, harvesting, etc. In detail, these labor costs can be seen in Table 1.

Table 1. Total labor costs

Labor cost	Dosage of eco-enzyme (L/ha)					
	0		150		300	
	WDP	Rp./ha	WDP	Rp./ha	WDP	Rp./ha
a. Tillage	30	3,000,000	30	3,000,000	30	3,000,000
b. Planting	30	3,000,000	30	3,000,000	30	3,000,000
c. Embroidery	4	400,000	4	400,000	4	400,000
d. Fertilization	0	0	4	400,000	4	400,000
e. Maintenance	4	400,000	4	400,000	4	400,000
f. Weed control	30	3,000,000	30	3,000,000	30	3,000,000
g. Harvest	80	8,000,000	80	8,000,000	80	8,000,000
h. Packing dan transport	16	1,600,000	16	1,600,000	16	1,600,000
i. Stick support	8	800,000	8	800,000	8	800,000
j. Irrigation	6	600,000	6	600,000	6	600,000
k. Pruning water shoots	6	600,000	6	600,000	6	600,000
Total	214	21,400,000	218	21,800,000	218	21,800,000

Remarks: Working day people (WDP), and 1 WDP = Rp. 100,000

Table 1 shows that the value of 1 WDP in this study was Rp 100,000,- The highest cost was the cost of harvesting, which was carried out for eight harvests with an average of 80 HKO of each harvest requiring 80 WDP of energy. The next highest cost was the use of labor for tillage in the form of stage one plowing, stage two plowing, and the manufacture of beds or sample plots. Other highest labor costs were planting, weed control, packing, and transport. Labor costs included were low: embroidery, maintenance, stick support, watering, and pruning of water shoots. The number of workers in the 0 L/ha was 210 WDP, while with dose treatment of 150 and 300 L/ha, there used 218 WDP. The dosage of 150 and 300 L/ha led to increased working costs of Rp. 400,000/ha. According to Samshunnahar et al. (2016), human labor and tillage were significant positive variables, which means that various independent inputs effectively contribute to increasing tomato production.

Infrastructure Costs

The infrastructure cost included purchasing seeds, inorganic fertilizers, stick support, pesticides, and eco-enzymes. More details on the cost of facilities and infrastructure can be seen in Tables 2 and 3.

Table 2. Cost of infrastructure

Labor cost	Dosage of eco-enzyme (L/ha)					
	0		150		300	
	Unit	Rp./ha	Unit	Rp./ha	Unit	Rp./ha
a. Seedlings (stems)	30	40,000	Unit	Rp./ha	40,000	3,000,000
b. Inorganic fertilizers (kg/ha)	30	40	40,000	3,000,000	40	3,000,000
c. Eco-enzyme (L/ha)	4	0	40	3,000,000	300	4,500,000
d. Ajir bamboo	0	40,000	150	2,250,000	40,000	400,000
d. Pesticide (L)	4	2	40,000	400,000	2	400,000
Total costs	30		2	400,000		9,100,000

Remarks: Price of 1 stem of seedlings @ Rp. 40, price of 1 kg of inorganic fertilizer (NPK pearls) @ Rp. 15,000, price of 1 L eco-enzyme @ Rp. 15,000, 1 Ajir bamboo @ Rp.50, and the price of pesticides/bottles @ Rp. 200,000.

Table 2 shows the total cost of facilities and infrastructure at dosages of 0, 150, and 300 L/ha were Rp. 4,600,000/ha, Rp. 6,850,000/ha, and Rp. 9,100,000/ha, respectively. The use of eco-enzymes at dosages of 150 and 300 L/ha was an increase in costs of Rp. 2,250,000/ha and Rp. 4,500,000/ha, respectively.

Total Production Cost (TC)

Total production costs were the sum of land rental costs, labor costs, and infrastructure, as is shown in Table 3.

Table 3. Total production costs

Production costs	Dosage of eco-enzyme (L/ha)		
	0	150	300
Total 1+2+ 3 (Rp./ha)	30,000,000	32,650,000	34,900,000

Table 3 shows that the production costs at dosages of 150 and 300 L/ha were due to labor costs for applying and purchasing eco-enzymes. Increasing in total production costs at dosages of 150 L/ha was Rp. 2,650.00/ha, while at a dosage of 300 L/ha was Rp. 4,900,000/ha compared to 0 L/ha.

Production and Gross Revenue

The gross income (TR) of tomato farming is the multiplication of the price of tomato fruit (P) by the amount of production (Q), which can be shown in Table 4.

Table 4. Production and gross income

	Dosage of eco-enzyme (L/ha)		
	0	150	300
1. Tomato production (kg./ha)	7,847.60	8,396.33	9,008.87
2. Price (Rp/kg)	8,000	8,000	8,000
Total gross revenue (Rp./ha)	62,780,800	67,170,667	72,070,933

Table 4 shows that the lowest gross income at 0 L/ha was Rp. 62,780,800/ha, the increase in the dosage of 150 L/ha was Rp. 67,170,667/ha, the highest at the dosage of 300 L/ha, provided an income of Rp. 72, 070,933/ha. According to Naika et al. (2019), farmers need to get a higher price for tomatoes than the cost of producing and marketing tomatoes. Engindeniz (2007) adds that

farmers should collect economic data on tomato production and market conditions before making production decisions.

The profitability and feasibility of tomato farming

The profit of tomato farming can be calculated from TR – TC. Calculation of farm feasibility using the TR/TC ratio. Tomato farming was profitable and feasible if the TR/TC > 1. The calculation results of TR/TC can be seen in Table 5.

Tabel 5. Profitability and feasibility of tomato farming

	Dosage of eco-enzyme (L/ha)		
	0	150	300
1. Gross revenue (Rp./ha) (TR)	62,780,800	67,170,667	72,070,933
2. Total production costs (Rp./ha) (TC)	29,700,000	31,950,000	34,200,000
Total profit (Rp./ha)	32,780,800	34,520,667	37,170,933
Profitability (Rp./ha)	0	1,739,867	4,390,133
Feasibility	2.1	2.1	2.1

Table 5 shows the lowest profit for tomato farming of Rp. 33,080,800/ha occurred in 0 L/ha. The dosage of 150 L/ha can increase farm profit by Rp. 34,520,667/ha, the highest income obtained in the eco-enzyme dosage of 300 L/ha, which profit was Rp. 37,870,933/ha. Using eco-enzymes can increase profits of Rp. 1,739,8867/ha (5.3%) for a dosage of 150 L/ha, while at a dosage of 300 L/ha was Rp. 4,390,133/ha (13.4%). The average TR/TC ratio of dosages of 0, 150, and 300 L/ha was 2.1, so it can be said that tomato farming was feasible.

CONCLUSIONS

Based on the analysis of the results and discussion, it can be concluded that the total production cost of tomato farming at 0 L / ha was Rp. 30,000,000/ha with a gross income of Rp. 62,780,800/ha and a profit of Rp. 32,780,800/ha. Unlike the dosage of 150 L/ha, total production was obtained cost of Rp. 32,650,000/ha, and a gross income of Rp. 67,170,667/ha and a profit of Rp. 34,520,667/ha. In the dosage of 300 L/ha, a production cost of Rp. 34,900,000/ha was required, and a gross opinion of Rp. 37,170,933/ha is obtained. Using co-enzyme dosages of 150 and 300 L/ha can increase profits of Rp. 1,739,867/ha (5.3%) and Rp. 4,390,133/ha (13.4%) compared to 0 L/ha, respectively. Tomato farming from the three treatments obtained a TR/TC ratio of 2.1 > 1,

which was feasible. Applying eco-enzymes at dosages of 150 and 300 L/ha can increase the income of tomato farmers compared to 0 L/ha (control). We suggest that an increase in eco-enzyme dosage of more than 300 L/ha can be done to obtain higher tomato farming profits.

ACKNOWLEDGEMENTS

We thank the Institute for Research and Community Service, Universitas PGRI Yogyakarta, which has given support for research funds. In addition, we thank the Faculty of Agriculture, Universitas PGRI Yogyakarta, which has provided loans for facilities in the form of equipment for research.

REFERENCES

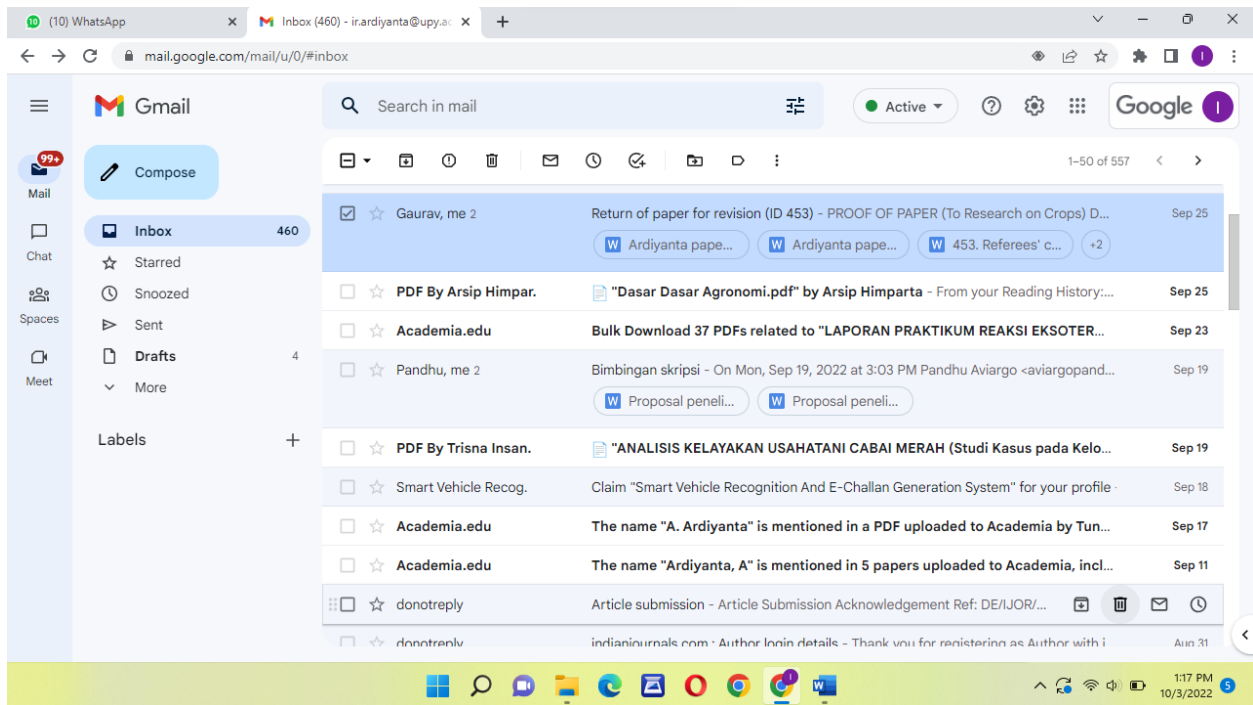
- Anonymous. (2019). *Produksi Tomat menurut Provinsi, 2015-2019*. 1 p.
- Das, S., and Jahan, M. (2022). Production and profitability intervention of summer hybrid tomato: A farm level review in Bangladesh. *American Journal of Economics and Business Administration*. 14: 21–30.
- Devianti, Satriyo, P., Bulan, R., Thamren, D. S., and Sitorus, A. (2021). Characteristics of the macronutrient content of compost and liquid organic fertilizer from agricultural wastes. *International Journal of Design and Nature and Ecodynamics*. 16(3): 315–20.
- Duhan, P. K. (2016). Cost benefit analysis tomato production in protected and open farm. *International Journal of Advanced Research in Management and Social Sciences*. 5(12): 140–48.
- El-khalifa, Z. S., Ayoub, A., and Zahran, H. F. (2022). Estimating the efficiency of summer tomatoes production: A case study in Borg El-Arab Area, Egypt. *Open Journal of Applied Sciences*. 12: 855–64.
- Engindeniz, S. (2007). Economic analysis of processing tomato growing: The case study of Torbali, west Turkey. *Spanish Journal of Agricultural Research*, 5(1), 7–15.
- Eshtiaghi, M. N., and Nakthong, N. (2020). Potential use of eco-enzyme for the treatment of metal based effluent Potential use of eco-enzyme for the treatment of metal based effluent. In *IOP Conf. Series: Materials Science and Engineering 716 (2020) 012016* (pp. 1–7).
- Galintin, O., Rasit, N., and Hamzah. (2021). Production and characterization of eco enzyme produced from fruit and vegetable wastes and its influence on the aquaculture sludge. *Biointerface Research in Applied Chemistry*. 11(3): 10205–14.

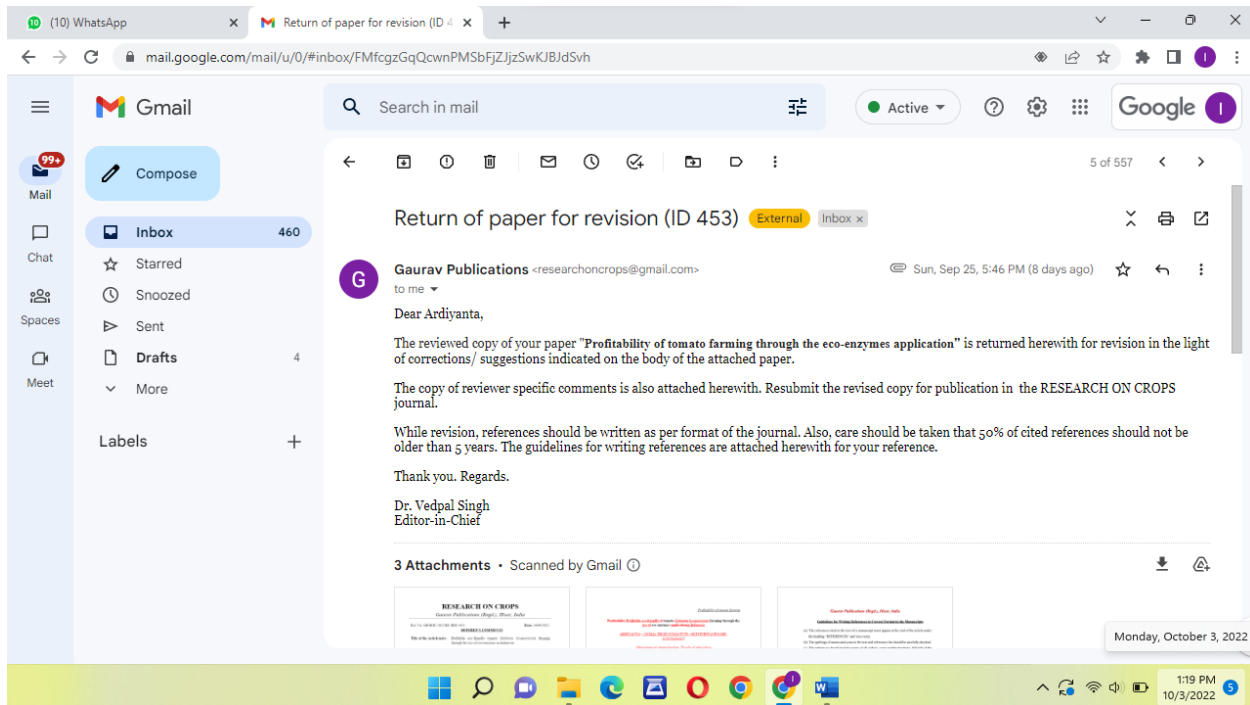
- Gatahi, D. M. (2020). Challenges and opportunities in tomato production chain and sustainable standards. *International Journal of Horticultural Science and Technology*. 7(3): 235–62.
- Hasanah, Y., Ginting, J., and Syahputra, A. S. (2022). Role of potassium source from eco enzyme on growth and production of shallot (*Allium ascalonicum* L.) varieties. *Asian Journal of Plant Sciences*. 21(1): 32–38.
- Hasanah, Y., Mawarni, L., and Hanum, H. (2020). Eco enzyme and its benefits for organic rice production and disinfectant. *Journal of Saintech Transfer*. 3(2): 119–28.
- Janarthaan, M., Mani, K., and Raja, S. R. S. (2020). Purification of contaminated water using eco enzyme. In *IOP Conf. Series: Materials Science and Engineering 955 (2020) 012098* (pp. 1–7).
- Kerkar, S. S., and Salvi, S. S. (2021). Application of eco-enzyme for domestic waste water treatment. *International Journal for Research in Engineering Application & Management*. 5(11): 1–4.
- Kushwaha, R. K., Sharma, N. P., and Baldodiya, V. K. (2018). Profitability of tomato (*Lycopersicon esculentum*) production in some selected areas in Panna District of Madhya Pradesh. *Int.J.Curr.Microbiol.App.Sci*. Special Issue(6): 2117–24.
- Mwatawala, H. W., Mponji, R., and Sesela, M. F. (2019). Factors influencing profitability of small-scale tomato (*Lycopersicon esculentum*) production in Mvomero District, Tanzania. *International Journal of Progressive Sciences and Technologies (IJPSAT)*. 14(1): 114–21.
- Naika, S., Jeude, J. V. L. D., Goffau, M. D., Hilmi, M., and Dam, B. V. (2019). *Cultivation of tomato production, processing, and marketing*. Agromisa Foundation and CTA, Wageningen: 93 p.
- Novianto. (2022). Response of liquid organic fertilizer eco enzyme (Ee) on growth and production of shallot (*Allium ascalonicum* L.). *Juatika*. 4(1): 1–8.
- Nurjaman, K. M., Wulandari, A., and Istikorini, Y. (2022). Effect of endophytic fungi inoculation and ecoenzyme on the growth of gmelina (*Gmelina arborea* (Roxb.)) seedlings. In *IOP Conf. Series: Earth and Environmental Science 959 (2022) 012011* (pp. 1–8).
- Parvin, M. M. (2017). Farmer's profitability of tomato cultivation in the socio-economic context of Bangladesh: A study at Rangpur district. *International Journal of Applied Research Diversification*. 3(6): 9–15.
- Samshunnahar, M., Khanum, R., and Islam, M. S. (2016). Profitability of small-scale tomato

(Lycopersicon esculentum) production in some selected areas in Bangladesh. *The Agriculturists*. 14(1): 73–82.

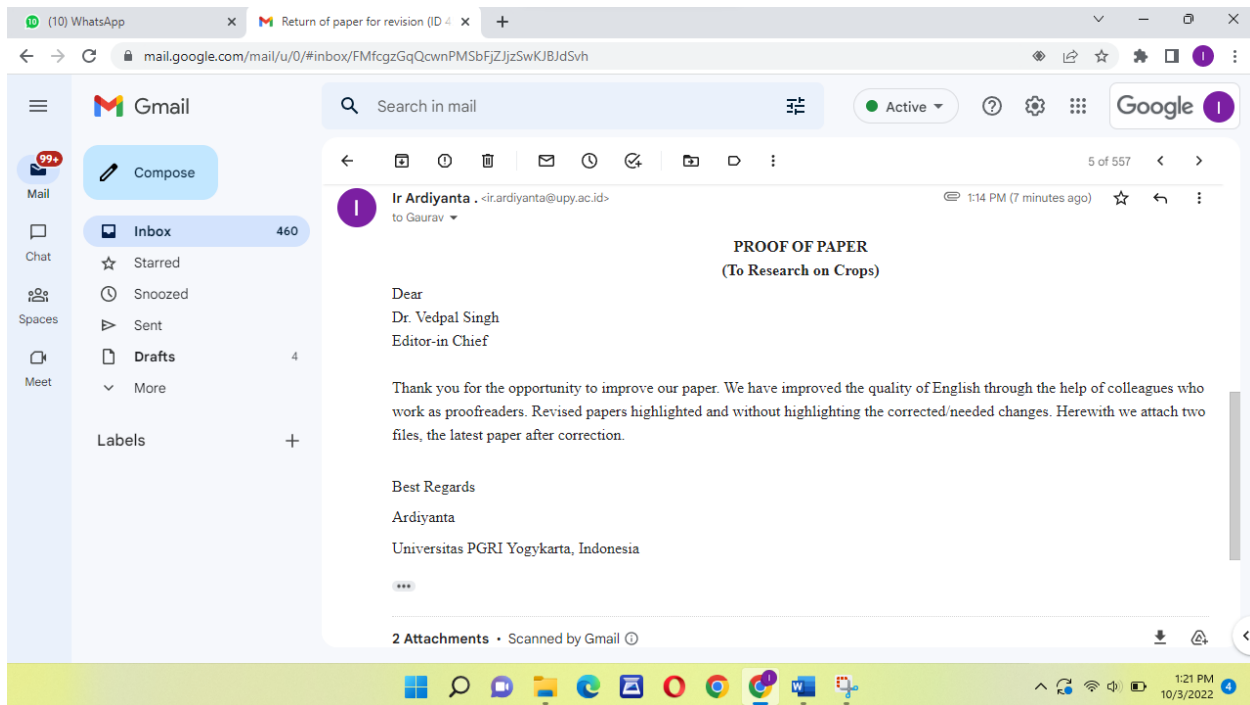
Sekumade, A. B., and Toluwase, S. O. W. (2014). Profitability and production efficiency of indigenous tomato cultivation among farmers in Osun State, Nigeria. *IOSR Journal of Agriculture and Veterinary Science*. 7(11): 13–23.

Perbaiki paper : 25 Sept 2022





Revised submission 03/10/22



Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia

ARDIYANTA^{1,*}, CILICIA TRI KUSUMASTUTI¹, OKTI PURWANINGSIH¹
AND PAIMAN¹

¹*Department of Agrotechnology, Faculty of Agriculture
Universitas PGRI Yogyakarta, Yogyakarta 55182, Indonesia
(e-mail: ir.ardiyanta@upy.ac.id)

ABSTRACT

Although there is a high demand for tomatoes, supply has not kept up with this demand in Indonesia. Using chemical fertilizers to increase output harms the soil's chemical composition, creating risks for the ecosystem. The use of eco-enzyme, an organic fertilizer, is one substitution option. This study aimed to determine the profitability of tomato farming through the use of eco-enzymes. This study was arranged in a randomized complete block design (RCBD) with three replications (replication as a block). The eco-enzyme dosages consisted of three-levels: 0, 150, and 300 L/ha. Each replication consisted of 6 plants per sample plot. The area of the sample plot was 1.5 m². The total cost (TC) and total revenue (TR) were calculated based on all costs and revenues in the sample plot area and then converted to the area per ha. The results showed that using eco-enzyme dosages of 150 and 300 L/ha can increase profits by US\$ 114.18/ha (5.3%) and US\$ 288.10/ha (13.4%) compared to 0 L/ha (control), respectively. Tomato farming with eco-enzyme doses of 150 and 300 L/ha or control obtained a TR/TC ratio of 2.1. Its means that tomato farming was feasible because TR/TC > 1. The research findings show that using eco-enzymes at dosages of 150 and 300 L/ha can increase the profitability of tomato farming. The future research, we suggest that using eco-enzymes at a dosage higher than 300 L/ha can be applied for profitability in tomato farming.

Key words: Organic fertilizer, production, total cost, total revenue, waste

INTRODUCTION

Tomato (*Solanum lycopersicum* L.) is an important member of the Solanaceae family. It is mainly used globally as a food and commercial crop (Gatahi, 2020) and as one of Indonesia's horticultural commodities with high economic value. The prospects for the development of tomatoes are up-and-coming. The needs of the market from year to year are continuously increasing. The community needs tomato fruit to complement the spices of dishes so that it can be consumed directly in fresh form or juice.

Farmers are interested in tomato production by cultivating new varieties because tomatoes are short-lived and profitable vegetables (Das and Jahan, 2022). High tomato production depends on using superior varieties, better management, and timely provision of inputs (Parvin, 2017). In Indonesia, tomato production from 2015-2019 increased yearly (Anonymous, 2019). However, chemical fertilizers are often used excessively, increasing production costs and not achieving economic efficiency (El-khalifa *et al.*, 2022). The use of superior varieties and the availability of production facilities will determine the production of tomatoes. However, excessive use of inorganic fertilizers will lead to a deterioration and the environment's physical properties. Therefore, the use of chemical fertilizers should be reduced. One alternative is the use of eco-enzymes.

The production of eco-enzymes has the dual advantage of reducing the burden on organic waste management and is beneficial in agriculture, animal husbandry, household hygiene, etc. (Kerkar and Salvi, 2021). Eco-enzyme results from the fermentation of organic kitchen waste from fruits and vegetables mixed with brown sugar and water. Applying organic substances through eco-enzymes (fermented organic matter) can increase soil and plant productivity. Therefore, organic matter utilization is one of the environmentally friendly components for plant cultivation. However, how much dosage of eco-enzymes can use to maximize tomato fruit production is still unknown. Therefore, it is necessary to research the use of the optimal eco-enzyme dosage.

Eco-enzymes effectively act as environmentally friendly solutions to reduce the composition of food waste in solid waste landfills and have the potential to be applied to the wastewater industry (Galintin *et al.*, 2021). Waste is the residue or waste from a business or human activity that, if left unchecked, will negatively impact the environment. For example, household waste is commonly found in the skin of fruits and vegetables. But the community does not yet have the awareness to

use the waste, even though household waste has the potential to be the basic material for making eco-enzyme. Furthermore, the increasing population increases its activities, producing more waste.

The addition of eco-enzymes increased the availability of nutrients for plants (Nurjaman *et al.*, 2022). The production of liquid organic fertilizers with the main ingredients of agricultural waste significantly affects the content of macronutrients produced (Devianti *et al.*, 2021). Eco-enzymes are made from residues or household waste such as vegetable waste or fruit peels which are widely disposed of by the community. Eco-enzyme in the form of a liquid is dark brown with an intense fruity aroma.

Eco-enzyme is an unexpected composition formed from the fermentation of new kitchen waste, brown sugar, and water (Janarthaan *et al.*, 2020). Eco-enzymes are products produced using raw materials such as peeled fruits and vegetable residues, brown sugar, and water (Kerkar and Salvi, 2021). The eco-enzyme liquid is a product that is easy to use and produce. The manufacture of this product requires only water, sugar as a source of carbon, and organic waste of vegetables and fruits. Eco-enzymes have many benefits, including as a disinfectant and organic fertilizer. According to Eshtiaghi and Nakthong (2020), eco-enzyme can inhibit the growth of microorganisms in wastewater and can treat metal-based effluent.

Eco-enzyme is a liquid fermented from the organic waste of fruits, vegetables, and other organic waste, which is very useful for agriculture (Hasanah *et al.*, 2020). Using eco-enzymes increased dry bulb weight by 20.47 compared to control (Hasanah *et al.*, 2022). Eco-enzymes can provide nutrients and improve soil's physical properties, chemical and biological properties, and product quality. Eco-enzymes significantly affected root length and leaves number at a dosage of 1.75 ml/L of water on shallots (Novianto, 2022).

The provision of eco-enzymes can increase tomato production and is also expected to increase farm income. According to Duhan (2016), Profit analysis compares total costs and revenues. The difference between total revenue and costs is referred to as total profit. Therefore, profit is the total revenue minus the total costs. However, added research results by Mwatawala *et al.* (2019), several factors that affect profitability are farming experience, land area, and access to market information. Furthermore, organizations or groups must be formed to increase profitability among farmers to facilitate the marketing of tomato products.

The total fixed and variable costs constitute the total cost of production per hectare of crop. Operational costs are costs related to the cost of running a farming business (Kushwaha *et al.*,

2018). Fixed costs (FC) refer to costs that do not vary with the production level, while variable costs (VC) refer to those that vary with production. Total costs (TC) are the sum of total fixed costs (TFC) and total variable costs (TVC) (Sekumade and Toluwase, 2014).

The reference study above shows that using eco-enzymes to increase tomato production has not been a concern of previous researchers. In addition, research on the profitability of tomato farming through the use of eco-enzymes has never been done. However, this research can contribute to increasing tomato production to increase the profit of tomato farming. Therefore, this study aimed to determine the profitability of tomato farming through the use of eco-enzymes.

MATERIALS AND METHODS

Study Area

This research was conducted in Soboman Village, Ngestiharjo, Kasihan, District of Bantul, Yogyakarta, Indonesia. The study was conducted in January-June 2022. The tools that were used in this study were hoes, sprayers, and digital scales. In addition, the materials of Corona variety seedlings, NPK Mutiara fertilizer, eco-enzymes, stick bamboo, and pesticides were used in this study.

Experimental Design

This research was conducted in the field and arranged in a randomized complete block design (RCBD) and three replications (replication as a block). The dosage of eco-enzyme consisted of three levels: 0, 150, and 300 L/ha. Each replication consisted of 6 plants per sample plot. The area of the sample plot was 1.5 m². The TC and TR were calculated based on all costs and revenues in the sample plot area, then converted to the area per ha.

The TC of production of tomato farming included fixed costs (FC) and variable costs (VC). Fixed costs (FC) were only for land leases. Variable costs (VC) were labor and infrastructure costs. Labor costs included tillage, planting, embroidery, maintenance, weed and disease control, tide, irrigation, and harvesting. The infrastructure cost included seeds, inorganic fertilizers, ajir stake, pesticides, and eco-enzymes. The TR of tomato farming was the multiplication of the price of tomato fruit (P) by the amount of production (Q) at that time.

Profitability of tomato farming through the use of eco-enzymes was calculated using the formula TR/TC ratio.

Research Procedures

This research used regosol soil type. Tillage using a hoe at a depth of 0-20 cm. The soil was loosened, then a sample plot of 1.0 m (width) × 1.5 m (length) or an area of 1.5 m² was made, and the soil was left for two weeks. Tomato seedlings were ground at the age of 14 days after sowing. The seeds were obtained from the Trubus store seed provider in Yogyakarta. Planting was carried out by separating the seedlings from the polybags, then planted into the beds at a plant spacing of 0.5 m × 0.5 m. Seedlings were planted on a sample plot with two rows; each row consisted of three plants.

Watering was carried out once every two days every morning. Applying 40 kg/ha NPK was carried out 14 days after planting (DAP). The application of eco-enzymes was performed on tomato plants at 14 DAP with the appropriate treatment dosage. Pest control of the Whitefly was carried out twice during the study using the Curacron pesticide. Locust control was carried out manually.

The first harvesting of tomato fruits was carried out at 60 DAP. The characteristic of the harvested fruit was that 50% of the fruit was red. Then, harvesting was carried out seven times during the study, once every four days.

Observation Variable

In this study, the observed variables include a land lease, labor costs, infrastructure costs, amount of tomato production, TR, and TC.

Statistical Analysis

To calculate the profitability of tomato farming, used a formula of TR/TC ratio. Tomato farming was profitable if the $TR/TC > 1$. Otherwise, If $TR/TC < 1$, showed that tomato farming was not profitable.

RESULTS AND DISCUSSION

Production costs

Land Lease

Farmed fixed costs were incurred only for land leases (FC). The cost of renting land was US 262.50 per growing season. One growing season was calculated for four months. Tillage until the end of the harvest takes four months. The location of the paddy fields used was technically watered.

Labor Costs

The labor costs of tomato farming included the cost of tillage, planting, embroidery, maintenance, weed and disease control, tide, irrigation, harvesting, etc. In detail, these labor costs can be seen in Table 1.

Table 1 shows that the value of one WDP in this study was US\$ 6.56. The highest cost was the cost of harvesting, which was carried out for eight harvests, with an average of 80 WDP of each harvest requiring 80 WDP of labor. The highest cost was labor for tillage in the form of stage one plowing, stage two plowing, and the manufacture of beds or sample plots. Other highest labor costs were planting, weed control, packing, and transport. Labor costs included were low: embroidery, maintenance, stick support, watering, and pruning of water shoots. The number of workers in the 0 L/ha was 210 WDP, while with dose treatment of 150 and 300 L/ha, there used 218 WDP. The 150 and 300 L/ha increased working costs of US\$ 26,25/ha. According to Samshunnahar *et al.* (2016), human labor and tillage were significant positive variables, which means that various independent inputs effectively contribute to increasing tomato production.

Infrastructure Costs

The infrastructure cost included purchasing seeds, inorganic fertilizers, stick support, pesticides, and eco-enzymes. More details on the cost of facilities and infrastructure can be seen in Tables 2 and 3.

Table 2 shows the total cost of facilities and infrastructure at dosages of 0, 150, and 300 L/ha were US\$ 301.88/ha, US\$ 449.53/ha, and US\$ 597.19/ha, respectively. On the other hand, using eco-enzymes at dosages of 150 and 300 L/ha increased costs of US\$ 147.66/ha and US\$ 295.31/ha, respectively.

Total Production Cost (TC)

Total production costs were the sum of the land rental, labor, and infrastructure. The total production cost is shown in Table 3.

Table 3 shows that the production costs at dosages of 150 and 300 L/ha were due to labor costs for applying and purchasing eco-enzymes. Increasing total production costs at dosages of 150 L/ha was U\$ 173.91/ha, while at a dosage of 300 L/ha was U\$ 321.56/ha compared to 0 L/ha (control).

Production and Total Revenue

The total revenue (TR) of tomato farming is the multiplication of the price of tomato fruit (P) by the amount of production (Q), which can be shown in Table 4

Table 4 shows that the lowest total revenue at dosage of 0 L/ha was U\$ 4,120.02/ha, the increase in the dosage of 150 L/ha was U\$ 4,408.10/ha, and the highest was at the dosage of 300 L/ha provided an income of U\$ 4,729.68/ha. According to Naika *et al.* (2019), farmers need to get a higher price for tomatoes than the cost of producing and marketing tomatoes. Engindeniz (2007) adds that farmers should collect economic data on tomato production and market conditions before making production decisions.

Profitability of Tomato Farming

The profit of tomato farming can be calculated from $TR - TC$. Calculation of farm feasibility using the TR/TC ratio. Tomato farming was profitable and feasible if the $TR/TC > 1$. The calculation results of TR/TC can be seen in Table 5.

Table 5 shows the lowest profit for tomato farming of U\$ 2,170.94/ha occurred in eco-enzyme dosage of 0 L/ha. The dosage of 150 L/ha can increase farm profit by U\$ 2,265.43/ha, the highest income obtained in the eco-enzyme dosage of 300 L/ha, which profit was U\$ 2,485.29/ha. Using eco-enzymes can increase profits of U\$ 114.18/ha (5.3%) for a dosage of 150 L/ha, while at a dosage of 300 L/ha was U\$ 288.10/ha (13.4%). The average TR/TC ratio of dosages of 0, 150, and 300 L/ha was 2.1, so it can be said that tomato farming was profitable.

CONCLUSIONS

Based on the results and discussion, it can be concluded that using eco-enzyme dosages of 150 and 300 L/ha can increase profits by U\$ 114.18/ha (5.3%) and U\$ 288.10/ha (13.4%) compared to 0 L/ha (control), respectively. Tomato farming with eco-enzyme dosage of 150 and 300 L/ha or control obtained a TR/TC ratio of 2.1. It means that tomato farming is feasible because $TR/TC > 1$. Therefore, the study findings show that using eco-enzymes at dosages of 150

and 300 L/ha can increase the profitability of tomato farming. The future research, we suggest that using eco-enzymes at a dosage higher than 300 L/ha can be applied for profitability in tomato farming.

ACKNOWLEDGEMENTS

We thank the Institute for Research and Community Service, Universitas PGRI Yogyakarta, which has given support for research funds. In addition, we thank the Faculty of Agriculture, Universitas PGRI Yogyakarta, which has provided loans for facilities in the form of equipment for research.

REFERENCES

- Anonymous. (2019). *Produksi Tomat menurut Provinsi, 2015-2019*. pp.1.
- Das, S. and Jahan, M. (2022). Production and profitability intervention of summer hybrid tomato: A farm level review in Bangladesh. *Am. J. Econ. Bus. Adm.* **14**: 21–30.
- Devianti, Satriyo, P., Bulan, R., Thamren, D. S. and Sitorus, A. (2021). Characteristics of the macronutrient content of compost and liquid organic fertilizer from agricultural wastes. *Int. J. Des. Nat. Ecodynamics.* **16**(3): 315–20.
- Duhan, P. K. (2016). Cost benefit analysis tomato production in protected and open farm. *Int. J. Adv. Res. Manag. Soc. Sci.* **5**(12): 140–48.
- El-khalifa, Z. S., Ayoub, A. and Zahran, H. F. (2022). Estimating the efficiency of summer tomatoes production: A case study in Borg El-Arab Area, Egypt. *Open J. Appl. Sci.* **12**: 855–64.
- Engindeniz, S. (2007). Economic analysis of processing tomato growing: The case study of Torbali, west Turkey. *Spanish J. Agric. Res.* **5**(1), 7–15.
- Eshtiaghi, M. N. and Nakthong, N. (2020). Potential use of eco-enzyme for the treatment of metal based effluent Potential use of eco-enzyme for the treatment of metal based effluent. In: Proc. The Third Bioprocessing and Biomanufacturing Symposium 2019. IOP Conf. Series: Materials Science and Engineering 716 (2020) 012016 (pp. 1–7).
- Galintin, O., Rasit, N. and Hamzah. (2021). Production and characterization of eco enzyme produced from fruit and vegetable wastes and its influence on the aquaculture sludge. *Biointerface Res. Appl.* **11**(3): 10205–14.

- Gatahi, D. M. (2020). Challenges and opportunities in tomato production chain and sustainable standards. *Int. J. Hortic. Sci. Technol.* **7**(3): 235–62.
- Hasanah, Y., Ginting, J. and Syahputra, A. S. (2022). Role of potassium source from eco enzyme on growth and production of shallot (*Allium ascalonicum* L.) varieties. *Asian J. Plant Sci.* **21**(1): 32–38.
- Hasanah, Y., Mawarni, L. and Hanum, H. (2020). Eco enzyme and its benefits for organic rice production and disinfectant. *J. Saintech Transf.* **3**(2): 119–28.
- Janarthaan, M., Mani, K. and Raja, S. R. S. (2020). Purification of contaminated water using eco enzyme. In: Proc. FIC-SISTEEM-2020. IOP Conf. Series: Materials Science and Engineering 955 (2020) 012098 (pp. 1–7).
- Kerkar, S. S. and Salvi, S. S. (2021). Application of eco-enzyme for domestic waste water treatment. *Int. J. Res. Eng. Appl. Manag.* **5**(11): 1–4.
- Kushwaha, R. K., Sharma, N. P. and Baldodiya, V. K. (2018). Profitability of tomato (*Lycopersicon esculentum*) production in some selected areas in Panna District of Madhya Pradesh. *Int.J.Curr.Microbiol.App.Sci. Special Is* (6): 2117–24.
- Mwatawala, H. W., Mponji, R. and Sesela, M. F. (2019). Factors influencing profitability of small-scale tomato (*Lycopersicon esculentum*) production in Mvomero District, Tanzania. *Int. J. Progress. Sci. Technol (IJPSAT)*. **14**(1): 114–21.
- Naika, S., Jeude, J. V. L. D., Goffau, M. D., Hilmi, M. and Dam, B. V. (2019). *Cultivation of tomato production, processing, and marketing*. Agromisa Foundation and CTA, Wageningen: pp. 93.
- Novianto. (2022). Response of liquid organic fertilizer eco enzyme (Ee) on growth and production of shallot (*Allium ascalonicum* L.). *Juatika*. **4**(1): 1–8.
- Nurjaman, K. M., Wulandari, A. and Istikorini, Y. (2022). Effect of endophytic fungi inoculation and ecoenzyme on the growth of gmelina (*Gmelina arborea* (Roxb.)) seedlings. In: Proc. ICTS 2021. IOP Conf. Series: Earth and Environmental Science 959 (2022) 012011 (pp. 1–8).
- Parvin, M. M. (2017). Farmer's profitability of tomato cultivation in the socio-economic context of Bangladesh : A study at Rangpur district. *Int. J. Appl. Res. Diversif.* **3**(6): 9–15.
- Samshunnahar, M., Khanum, R. and Islam, M. S. (2016). Profitability of small-scale tomato (*Lycopersicon esculentum*) production in some selected areas in Bangladesh. *Agric.* **14**(1): 73–82.

Sekumade, A. B. and Toluwase, S. O. W. (2014). Profitability and production efficiency of indigenous tomato cultivation among farmers in Osun State, Nigeria. *IOSR J. Agric. Vet. Sci.* 7(11): 13–23.

Table 1. Total labor costs

Labor cost	Dosage of eco-enzyme (L/ha)					
	0		150		300	
	WDP	U\$/ha	WDP	U\$/ha	WDP	U\$/ha
a. Tillage	30	196.88	30	196.88	30	196.88
b. Planting	30	196.88	30	196.88	30	196.88
c. Embroidery	4	26.25	4	26.25	4	26.25
d. Eco-enzym application	0	0	4	26.25	4	26.25
e. Maintenance	4	26.25	4	26.25	4	26.25
f. Weed control	30	196.88	30	196.88	30	196.88
g. Harvest	80	525.00	80	525.00	80	525.00
h. Packing dan transport	16	105.00	16	105.00	16	105.00
i. Stick support	8	52.50	8	52.50	8	52.50
j. Irrigation	6	39.38	6	39.38	6	39.38
k. Pruning water shoots	6	39.38	6	39.38	6	39.38
Total	214	1,404.38	218	1,430.63	218	1,430.63

Remarks: Working day people (WDP), and 1 WDP = US\$ 6.56

Table 2. Cost of infrastructure.

Labor cost	Dosage of eco-enzyme (L/ha)					
	0		150		300	
	Unit	U\$/ha	Unit	U\$/ha	Unit	U\$/ha
a. Seedlings (stems)	40,000	105.00	40,000	105.00	40,000	105.00
b. Inorganic fertiliser (kg/ha)	40	39.38	40	39.38	40	39.38
c. Eco-enzyme (L/ha)	0	0	150	147.66	300	295.31
d. Stick bamboo (stem)	40000	131.25	40000	131.25	40000	131.25
d. Pesticide (L)	2	26.25	2	26.25	2	26.25
Total costs		301.88		449.53		597.19

Remarks: Price of 1 stem of seedlings @ US\$. 0.002625, price of 1 kg of inorganic fertilizer (NPK Mutiara) @ US\$. 0.98438, price of 1 L eco-enzyme @ US\$. 0.98438, 1 stick bamboo @ US\$. 0.003281, and the price of pesticides/bottles @ US\$. 13.125.

Table 3. Total production costs.

Production costs	Dosage of eco-enzyme (L/ha)		
	0	150	300
Total = 1 + 2 + 3 (U\$/ha)	1,968.76	2,142.67	2,290.33

Table 4. Production and gross income.

	Dosage of eco-enzyme (L/ha)		
	0	150	300
1. Tomato production (kg/ha)	7,847.60	8,396.33	9,008.87
2. Price (U\$/kg)	0.53	0.53	0.53
Total gross revenue (U\$/ha)	4,120.02	4,408.10	4,729.69

Table 5. Profitability and feasibility of tomato farming

	Dosage of eco-enzyme (L/ha)		
	0	150	300
1. Total revenue (U\$/ha)	4,120	4,408	4,729.68
2. Total production costs (U\$/ha)	1,949	2,097	2,244.39
Total profit (U\$/ha)	2,151	2,265	2,439.36
Profitability (U\$/ha)	0	114.18	288.10
Feasibility	2.1	2.1	2.1

Acceptance of paper for publication (ID 11141)

External

Inbox x



Gaurav Publications

to me ▾

Sun, Oct 9, 6:24 PM (4 days ago)



Dear Ardiyanta,

Attached herewith acceptance letter (pdf) of your paper "**Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia - Ardiyanta, Cicilia Tri Kusumastuti, Okti Purwaningsih and Paiman**" accepted for publication in the RESEARCH ON CROPS journal Vol. 23, No. 4 (December) 2022.

You are required to pay processing/publication fees of US \$ 600/- latest by October 15, 2022 on account of processing, editing and 6 page printing charges for publication of this paper including 5 tables. The pdf copy of an invoice is also attached herewith for an early processing of the payment.

We receive payment through Bank Transfer/Wire Transfer/SWIFT Transfer. Our bank details are given in the attached invoice.

In future, submit your papers, if any, for publication through online submission portal of our website: <https://gauravpublications.com>

Thank you. Regards.

Dr. Vedpal Singh
Editor-in-Chief
RESEARCH ON CROPS
Gaurav Publications , Systematic Printers
Near Video Market, Udayapura Street
Hisar-125 001, Haryana, India
Tel : +91 9354324922

RESEARCH ON CROPS

[Indexed by Scopus Q3/Elsevier, EBSCO, CrossRef, Google Scholar, DRJI, CABL, ICI etc.]

Ref. No.: GP-2022/ROC/11141/809

Dated: October 09, 2022

Subject: Acceptance of paper for publication

Dear Ardiyanta,

It is to inform you that your following paper/article has been peer reviewed by the expert reviewers and found suitable for publication. The paper is accepted for publication as full-length paper in RESEARCH ON CROPS journal Vol. 23, No. 4 (December) 2022.

Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia - Ardiyanta, Cicilia Tri Kusumastuti, Okti Purwaningsih and Paiman

Read the following:

1. The above article will cover 6 printed pages of the journal including 5 tables.
2. Indexed in Scopus, EBSCO, CiteFactor, Scientific Indexing Services Products and Services, etc.
3. Scopus Q3: Scimago Journal Ranking (SJR) 2021: 0.27
4. Scopus Impact Score 2021: 1.79
5. ResearchGate journal Impact 2019/2020: 0.17
6. NAAS, New Delhi rating/scoring for 2022: 4.56
7. Impact Factor (CiteFactor) 2020-2021: ● 1.30
8. Approved (SIS), CrossRef, DRJI, CABL, ICI, Google Scholar, ResearchGate, UDL-EDGE
9. by UGC (Included in CARE list of journals)
10. Each published paper is assigned with DOI number.
11. The pdf copy of published paper will be sent to corresponding author free of cost.
12. The pdf of galley paper for correction will be sent to author in last week of December 2022.
13. The print copy of journal is available on sale @ US \$ 100 per copy.

Yours Sincerely,

Sd/-
(Managing Editor)

GAURAV PUBLICATIONS, REGD.

Systematic Printers, Udayapuria Street, Video Market Hisar-125 001
Haryana, India

www.gauravpublications.com ; www.cropresearch.org



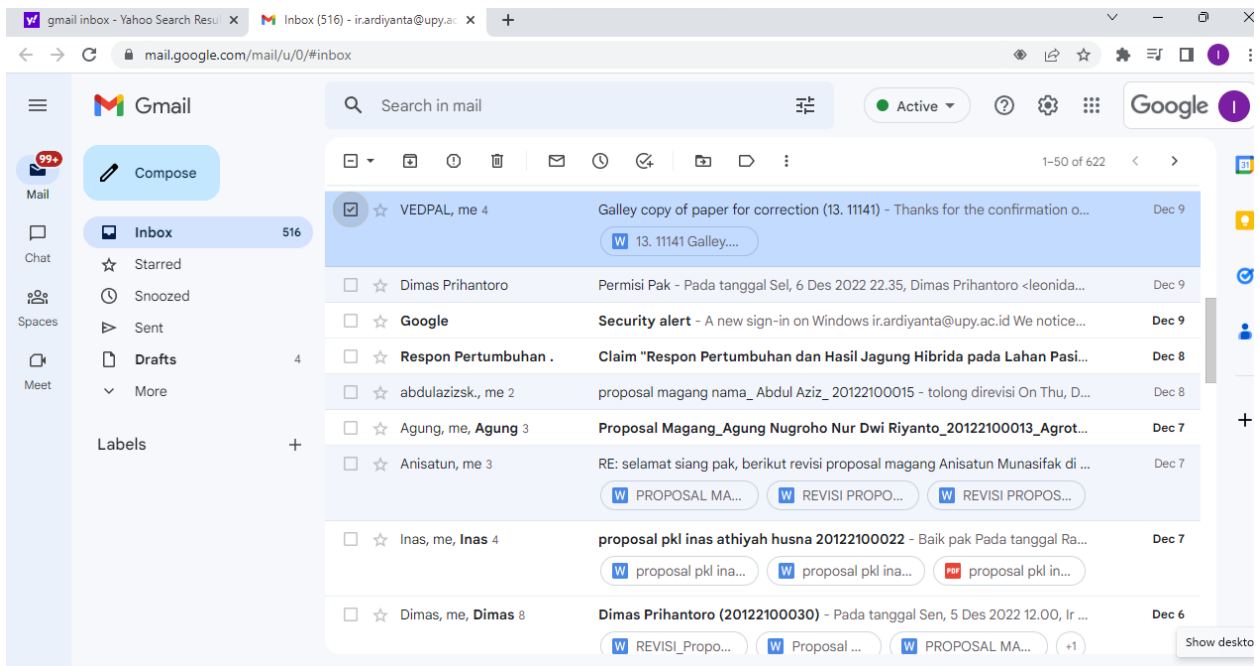
Tel: + 91 9354 324922
 email: info@gauravpublications.com
 researchoncrops@gmail.com

GAURAV PUBLICATIONS, REGD.

Systematic Printers, Udayapuria Street, Near Video Market, Hisar-125 001, India

Ardiyanta Department of Agrotechnology Faculty of Agriculture Universitas PGRI Yogyakarta Yogyakarta 55182 Indonesia		INVOICE	
		Invoice No. : ROC-2022/11141	
		Date : October 09, 2022	
		Your Ref. No: Your email dated August 31, 2022	
Sr. No.	Particulars	Rate (US \$)	Amount (US \$)
1	Publication charges of 6 printed pages including 5 tables and of your paper ID No. GP 2022/ROC-11141/809 entitled "Profitable eco-friendly tomato (<i>Solanum lycopersicum</i>) farming through the use of eco-enzymes in Indonesia - Ardiyanta, Cicilia Tri Kusumastuti, Oktl Purwaningsih and Palman" accepted for publication in RESEARCH ON CROPS journal Vol. 23, No. 4 (December) 2022.	US \$ 100/- (per printed page)	600.00
In words: Six hundred US dollars only		Total (US \$)	600.00
<p>Note: Payment should be sent through Bank Transfer/SWIFT Transfer. Our bank details are as under:</p> <p>1. Name and address of Bank : State Bank of India, Patel Nagar, Hisar-125001, Haryana, India 2. Beneficiary account name : Gaurav Publications 3. Beneficiary account number : 00000037014428711 4. Swift Code : SBININBB189 5. IFSC Code : SBEN0009280</p> <p><i>Send scan copy of the payment voucher/document through email for our record.</i></p> <p style="text-align: right;"><i>Sd/-</i> Managing Editor</p>			

Galery proof : 9 Desember 2022



il inbox - Yahoo Search Resu x Galley copy of paper for correcti x +

mail.google.com/mail/u/0/#inbox/FMfcgzGrbRXnwQXBHnGpFMnJKNWnZPz

Gmail Search in mail Active ? ? ? ? ? Google

Compose

Inbox 516

Starred

Snoozed

Sent

Drafts 4

More

Labels +

Galley copy of paper for correction (13. 11141) External Inbox x

VEDPAL SINGH Thu, Dec 8, 4:35 PM (11 days ago) ☆
Dear Ardiyanta, Attached herewith a copy of galley proof of your paper to be published in RESEARCH ON CROPS journal Vol. 23, No. 4...

Ir Ardiyanta . Fri, Dec 9, 9:33 AM (10 days ago) ☆
----- Forwarded message ----- From: VEDPAL SINGH <roceditor@gmail.com> Date: Thu, Dec 8, 2022 at 4:35 PM Subject: Galley...

Ir Ardiyanta . Fri, Dec 9, 9:49 AM (10 days ago) ☆
Dear Dr. Vedpal Singh Editor-in Chief Thank you for your email. Our paper have read and corrected. We are agree to be published and ...

VEDPAL SINGH to me Fri, Dec 9, 3:04 PM (10 days ago) ☆

Thanks for the confirmation of galley copy as final for publication. Thank you.

...
You are welcome Thank a lot Thank you for your response

gmail inbox - Yahoo Search Resu x Inbox (516) - ir.ardiyanta@upy.ac.id x +

mail.google.com/mail/u/0/#inbox?projector=1

13. 11141 Galley.docx Open with Google Docs Active ? ? ? ? ?

Compose

Inbox

Starred

Snoozed

Sent

Drafts

More

Labels

Profitability of tomato farming

Res. Crop. 23 (4): (2022)
Printed in India

Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia

ARDIYANTA*, CICILIA TRI KUSUMASTUTI, OKTI PURWANINGSIH
AND PAIMAN

Department of Agrotechnology, Faculty of Agriculture
Universitas PGRI Yogyakarta, Yogyakarta 55182, Indonesia
*(e-mail: ir.ardiyanta@upy.ac.id)
(Received: August 31, 2022 / Accepted: October 17, 2022)

ABSTRACT

Although there is a high demand for tomatoes, supply has not kept up with this demand in Indonesia. Using chemical fertilizers to increase output harms the soil's chemical composition, creating risks for the ecosystem. The use of eco-enzyme, organic fertilizer, is one substitution option. This study aimed to determine the profitability of tomato farming through the use of eco-

Page 1 of 11

Publish online : 17 December 2022

Gaurav Publications (Since 1998) Journals Services Policies LOGIN

Research On Crops
Home » Research on Crops » VOLUME 23 » ISSUE 4 (DECEMBER) » ROC-908

Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia

DOI: 10.31830/2348-7542.2022.ROC-908 | Article Id: ROC-908

Authors and affiliations

ARDIYANTA, CICILIA TRI KUSUMASTUTI, OKTI PURWANINGSIH AND PAIMAN ir.ardiyanta@upy.ac.id	Address : Department of Agrotechnology, Faculty of Agriculture, Universitas PGRI Yogyakarta, Yogyakarta 55182, Indonesia
--	--

Online Published: 17-12-2022

Abstract

Although there is a high demand for tomatoes, supply has not kept up with this demand in Indonesia. Using chemical fertilizers to increase

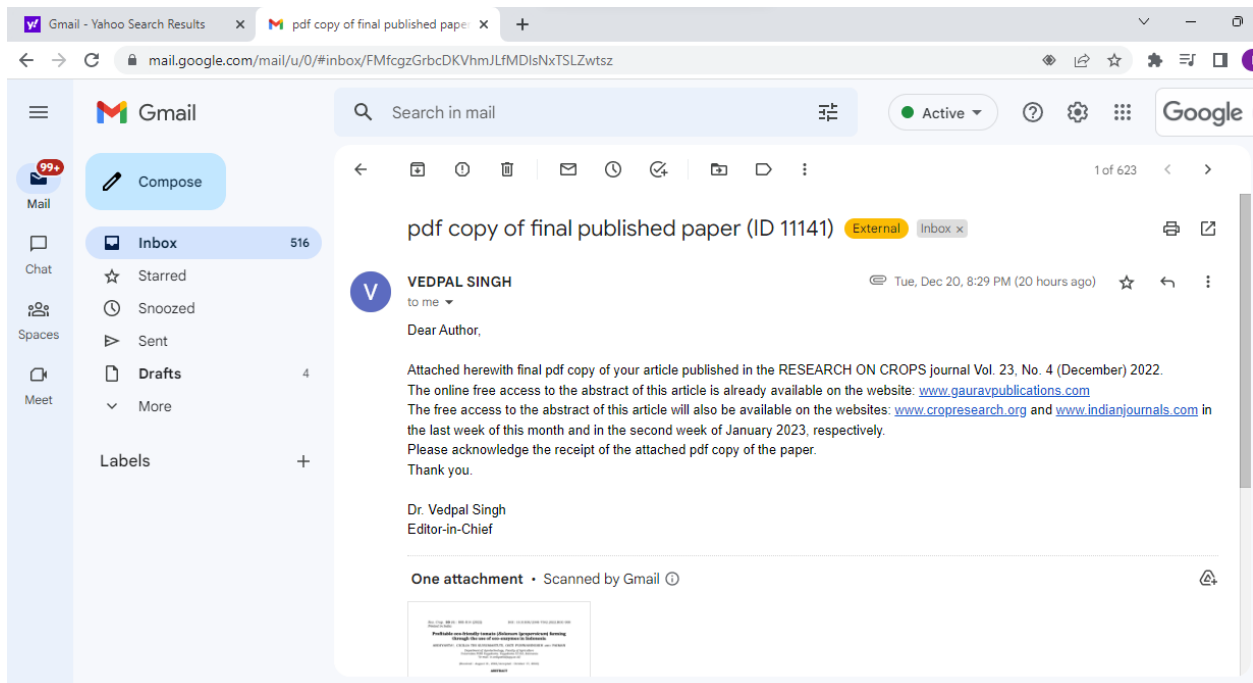


→ Editorial Board

Link publish online

<https://gauravpublications.com/journal/research-on-crops/ROC-908>

pdf copy of final published paper (ID 11141) 20 dec 2022



Gmail - Yahoo Search Results x pdf copy of final published paper: x +

mail.google.com/mail/u/0/#inbox/FMfcgzGrbcDKVhmJLfMDIsNxTSLZwtz

99+ Mail

Compose

Inbox 516

Starred

Snoozed

Sent

Drafts 4

More

Labels +

Search in mail

Active

Google

pdf copy of final published paper (ID 11141) External inbox x

VEDPAL SINGH to me Tue, Dec 20, 8:29 PM (20 hours ago)

Dear Author,

Attached herewith final pdf copy of your article published in the RESEARCH ON CROPS journal Vol. 23, No. 4 (December) 2022. The online free access to the abstract of this article is already available on the website: www.gauravpublications.com The free access to the abstract of this article will also be available on the websites: www.croprosearch.org and www.indianjournals.com in the last week of this month and in the second week of January 2023, respectively. Please acknowledge the receipt of the attached pdf copy of the paper. Thank you.

Dr. Vedpal Singh
Editor-in-Chief

One attachment • Scanned by Gmail

Online Published: 7 Januari 2023

<https://www.indianjournals.com/ijor.aspx?target=ijor:rcr&volume=23&issue=4&type=toc>

← → ↻ 🔍 ⚙️ 🏠

Horticultural & Vegetable Crops

[Physiological and phyto-pathological assessment scion-rootstock combinations for apple cv. Aport and *M. sieversii*](#)
Soltanbekov Sagi, Dolgikh Svetlana, Zhumagulova Moldir, Madenova Aigul, Isina Zhanna, Kabyzbekova Balnur

[Residual effect of biofortified iodine in soil, plant, crop yield and quality of tomato \(*Solanum lycopersicum* L.\)](#)
VR Mageshen, P. Santhy, S. Meena, MR. Latha, A. Senthil, T. Saraswathi, P. Janaki

[Profitable eco-friendly tomato \(*Solanum lycopersicum*\) farming through the use of eco-enzymes in Indonesia](#)
Ardiyanta, Tri Kusumastuti Cicilia, Purwaningsih Okti, Paiman

[Effect of harvest age and storage duration on viability and vigor of shallot \(*Allium cepa* L.\) tubers](#)
Muhammad Ansar, Bahrudin, Maemunah, Paiman

Plant Protection

[First recording of vibration signals caterpillars *Tecia solanivora* \(Lepidoptera: Gelechiidae\) in potato tubers](#)
L. S. Shestakov, J. A. Lovtsova

[Susceptibility of the vegetable leafminer, *Liriomyza sativae* \(Blanchard\) \(Diptera: Agramyzidae\) to lambda-cyhalothrin, abamectin, cypermethrin and clothianidin](#)
T. H. D. Tran, D. H. Tran

[Assosment of insect biodiversity on tomatoes, *Solanum lycopersicum* using LED traps](#)
Pachkin Alexey, Kremneva Oksana, Ivanisova Mariya, Ermakov Yaroslav, Leptyagin Daniil, Gasiyan Ksenia

[Resistance of pea \(*Pisum sativum* L.\) varieties to fungal diseases and their productivity in the South-East of Kazakhstan](#)
Suleimanova Gulnur, Kalibayev Bauyrzhan, Tumenbayeva Nagima, Sapakhova Zagipa

[Response of sugarcane aphid \(*Melanaphis sacchari*\) to interactive effects of soil drenched triterpenoid phytonematicides in sweet sorghum \(*Sorghum bicolor*\)](#)
K. G. Maleka, P. W. Mashela, K. M. Pofu

[Phylogenetic position of *Scutellonema brachyurus* \(Nematoda: Haplaimidae\) associated with tomato using 28S rDNA from South Africa](#)
Aminisarteshnizi Mehrmoush

[Molecular characters of *Enterobacter* using 16S rDNA isolated from tomato, Limpopo Province, South Africa](#)
Aminisarteshnizi Mehrmoush

[Phylogenetic position of *Mononchus* species \(Nematoda: Mononchida\) associated with tomato using 28S rDNA from South Africa](#)

URL Dokumen

<https://www.indianjournals.com/ijor.aspx?target=ijor:rcr&volume=23&issue=4&article=014>

← → ↻ 🔍 ⚙️ 🏠



Users online: 2242

(103.154.113.154)

Home About us My Profile Registration Products Article Submission Usage Statistics Price List 2023 Contact Us Tutorial Login/Register

Email id Log In

Research on Crops

Year : 2022, Volume : 23, Issue : 4
First page : (808) Last page : (814)
Print ISSN : 0972-3226, Online ISSN : 2348-7542
Article DOI : [10.31830/2348-7542.2022.ROC-908](https://doi.org/10.31830/2348-7542.2022.ROC-908)

Profitable eco-friendly tomato (*Solanum lycopersicum*) farming through the use of eco-enzymes in Indonesia

Ardiyanta^{*}, Cicilia Tri Kusumastuti, Okti Purwaningsih, Paiman
Department of Agrotechnology, Faculty of Agriculture, Universitas PGRI Yogyakarta, Yogyakarta, 55182, Indonesia
^{*}(e-mail: ir.ardiyanta@upy.ac.id)

Online published on 7 January, 2023.

Abstract

Although there is a high demand for tomatoes, supply has not kept up with this demand in Indonesia. Using chemical fertilizers to increase output harms the soil's chemical composition, creating risks for the ecosystem. The use of eco-enzyme, an organic fertilizer, is one substitution option. This study aimed to determine the profitability of tomato farming through the use of eco-enzymes. This study was arranged in a randomized complete block design (RCBD) with three replications (replication as a block). The eco-enzyme dosages consisted of three-levels: 0, 150, and 300 L/ha. Each replication consisted of 6 plants per sample plot. The area of the sample plot was 1.5 m². The total cost (TC) and total revenue (TR) were calculated based on all costs and revenues in the sample plot area and then converted to the area per ha. The results showed that using eco-enzyme dosages of 150 and 300 L/ha can increase profits by US 114.18/ha (5.3%) and US 288.10/ha (13.4%) compared to 0 L/ha (control), respectively. Tomato farming with eco-enzyme doses of 150 and 300 L/ha or control obtained a TR/TC ratio of 2.1. Its means that tomato farming was feasible because TR/TC > 1. The research findings show that using eco-enzymes at dosages of 150 and 300 L/ha can increase the profitability of tomato farming. The future research, we suggest that using eco-enzymes at a dosage higher than 300 L/ha can be applied for profitability in tomato farming.

Keywords

Journal Home
Current Issue
Archive / Issues
TOC
Prev Article
Next Article
Registration
Subscribe
Editorial Board
Aims & Scope
Author Guidelines
Ethics & Malpractice
News & Events
Subscribe TOC Alerts

Article Submission

FREE Sample Issue

Trial Access