

## **COVID-19: THE EFFECT ON RICE PRODUCTION IN CENTRAL JAVA PROVINCE**

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### **ABSTRACT**

The COVID-19 pandemic has had a significant impact on the agricultural sector, especially rice production in Indonesia. Rice is one of the commodities that has strategic value in the economy because of its role as the main source of food for humans. This study aims to provide a comprehensive review of the impact of the COVID-19 pandemic on rice production in all districts and cities in Central Java Province. The research data is secondary data obtained from the Central Bureau of Statistics (BPS) regarding rice production in Central Java Province during the 2019–2022 period. In the period of 2019-2022, there are three districts that contributed the highest rice production: Grobogan, Sragen, and Cilacap. Meanwhile, the three lowest contributors of rice production are: Tegal (City), Magelang (City) and Surakarta (City). This research uses a qualitative descriptive method and Wilcoxon Signed Rank Test to analyze the three conditions of COVID-19 pandemic: before, during and after. The test obtained that the before-during period and during-after period have no significant difference in rice production in Central Java. However, there was a significant difference in rice production in Central Java in the period before and after COVID-19 pandemic. The overall results show the impact of COVID-19 pandemic on rice production in Central Java.

**Keywords:** rice production, COVID-19, Central Java

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### **1. Introduction**

As happened in other countries, the Covid-19 pandemic also had an impact on the security of staple foods in Indonesia. It is undeniable that the effects of the Covid-19 pandemic were felt not only during the pandemic but also afterwards. The effects that occurred during the Covid-19 pandemic, especially on the security of food supply, can be seen from the distribution system, commodities, including availability, access to obtain and the nutrients contained. From the point of view of the demand for food supply, Covid-19 clearly threatens food security through its various impacts on the work of farmers, middlemen and so on and increasing poverty due to malnutrition and disrupted health. Launching world organizations such as the Food and Agriculture Organization (FAO), International Food Policy Research Institute (IFPRI) and the United Nation (UN) in 2021, the COVID-19 pandemic can trigger a food emergency that affects a country's food security, especially poor and developing countries such as Indonesia.

Indonesia is an agrarian country, which means that agriculture has a very important role in meeting basic needs. The agricultural sector is a primary sector that is very important for the national economy (Zaeroni & Rustariyuni, 2016). One of the very important basic needs of agricultural products is rice, there is even talk about "Indonesians haven't been called to eat if they haven't

eaten rice". Rice is a very important food commodity and is the staple food that has the greatest impact for Indonesian citizens (Sari, 2014).

The very high consumption of rice in Indonesia must be balanced with rice production so that national needs can be fulfilled. Therefore, the Government is obliged to pay full attention so that a major food crisis does not occur (Zaeroni & Rustariyuni, 2016). It is undeniable that the demand for and consumption of rice is increasing every year due to the extraordinary increase in the population. This should have been anticipated and even avoided by the state, by suppressing population numbers so that national food stability can be carried out.

Based on statistical data such as a report owned by Badan Pusat Statistik (BPS) for 2020, the dependence of the Indonesian people on rice consumption is much higher compared to other food products with an average consumption of 2,047 kilograms per capita per week. Other types of carbohydrates such as tubers, corn and sago cannot replace rice as the main carbohydrate in the household. Through this it can be seen that rice is a product with inelastic demand, where price changes hardly cause changes in the amount of consumer demand (Fitriani & Partini, 2019).

Adiba and Kaslam (2023) found that the results of the Government's efforts to overcome the impact of Covid-19 were focused on five things including (1) ensuring the availability of staple foods, especially rice and corn; (2) accelerating the export of strategic goods to support the country's economic progress; (3) disclose to farmers and health practice extension workers from the Ministry of Health to stop the escalation of the virus; (4) expanding agricultural markets in each Province, developing local food consumption, and building infrastructure; (5) implementing labour-intensive projects in rural areas to support the agricultural sector and provide financial assistance to the community to reduce the adverse effects of Covid-19 (Adiba & Kaslam, 2023).

Dahiri & Fitri (2020) in Abidin (2021) say that there are a number of factors that are hindering the Indonesian agricultural sector besides the availability of land, the level of agricultural production is also not optimal (Abidin, 2021). This is fully related to the ability of sectoral actors which results in the level of innovation and capability towards technology which is still relatively low. This low capability has had an impact on the production of the agricultural sector which has not been optimal. How to increase the skills of actors in the agricultural sector is needed to grow the rate of national economic growth.

According to the Ministry of Agriculture, rice production in 2019 fell by 8% from the previous year while in 2020 it fell by 9.7% from 2019. The decline in rice production as a result of the Covid-19 pandemic both before and after forced Indonesia to import rice from Thailand. Total rice production in the Java Sentra in 2020 amounted to 9.49 million tons of dry milled unhusked rice or decreased by 0.17 million tons, around 1.72% compared to 2019, so the Government of Central Java had to import rice to meet demand (Patanru & Amanta, 2022) in (Sitoresmi & Purnomo, 2022). The decline in rice production during the Covid-19 pandemic could have been due to the imposition of social restrictions and work from home (WFH) which limited the movement of farmers to carry out their activities in the fields. This policy also had an adverse impact, namely decreasing the income of farmers in Indonesia.

Agriculture for Indonesian is a sector that is very important and influential both in economic, social and political terms related to basic food needs, especially in rice as the main food commodity which must always be available. The need for rice in Indonesia is very large and it can be said that the Indonesian people are very dependent on rice as their main food. From 1984 to 1986, Indonesia had won the title of self-sufficiency in food, at that time the national consumption was only around 25 million tons and there was a surplus of up to 2 million tons.

## **2. Literature Review**

### **Rice Production**

Rice production is an agricultural activity that takes input from the environment and releases the results to the environment as well, so it has an impact on the environment. Rice production according to the Ministry of Agriculture is the amount of dry milled grain (GKG) produced from the harvested area of paddy rice and tidal land which is harvested during a certain growing season, and rice production is calculated in tons of GKG. Rice production is a process that involves many stages. Pre-planting activities which include selecting the right variety, preparing a planting calendar, and preparing paddy fields for planting. And after harvest, the paddy undergoes post-harvest processes including drying, storage, and milling to ensure good feeding quality and competitive marketability (Jekayinfa et al., 2018).

## **3. Research Methodology**

The research method uses quantitative descriptive analysis. The data used is rice production data from 2019 to 2022 in the Central Java Province region and was obtained from the Central Bureau of Statistics for Central Java Province. The analytical tool used is Wilcoxon Signed Rank Test. The Wilcoxon test serves to test the differences between paired data, test comparisons between observations before and after being given treatment and see the effectiveness of a given treatment (Scheff, 2016).

## **4. Results**

The total production of rice in Central Java Province recorded declining movement from 2019 to 2022, despite an increase in production in 2021. In 2019, the production total was 5,523,969 tons, while in 2020 total rice production was 5,456,832 tons. Total rice production decreased in 2021 and 2022 with total production of 5,513,297 tons and 5,380,510 tons. This shows that there was a rice production gap of 67,137 tons between 2019 and 2020. Meanwhile, from 2020 to 2021, there was an increase in rice production of 74,465 tons, but decreased production from 2021 and 2022 of 150,787 tons. Figure 1 below shows a clear explanation.

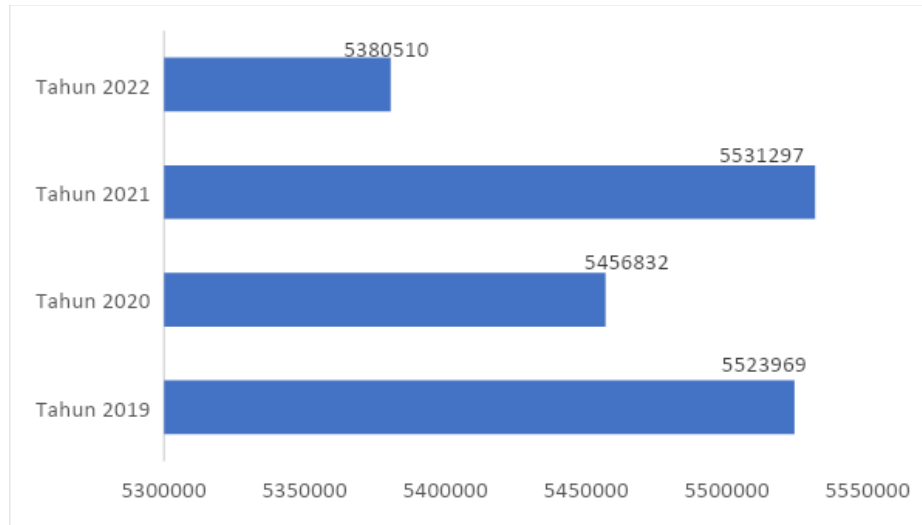


Figure 1. Total Rice Production in Central Java for 2019-2022

The total composition of rice production is supported by districts/cities in Central Java. In 2019, the district/city that contributed the highest rice production was Grobogan with a total rice production of 441,957 tons. The district/city that contributes the second largest rice production is Sragen with a production of 438,233 tons and the third largest is Cilacap with a production of 400,447 tons. Tegal (City), Magelang (City) and Surakarta (City) are three regencies/cities in Central Java that provide the lowest rice production with production of 2,056 tons, 554 tons and 165 tons. The composition of district/city rice production in 2019 can be seen in Figure 2.

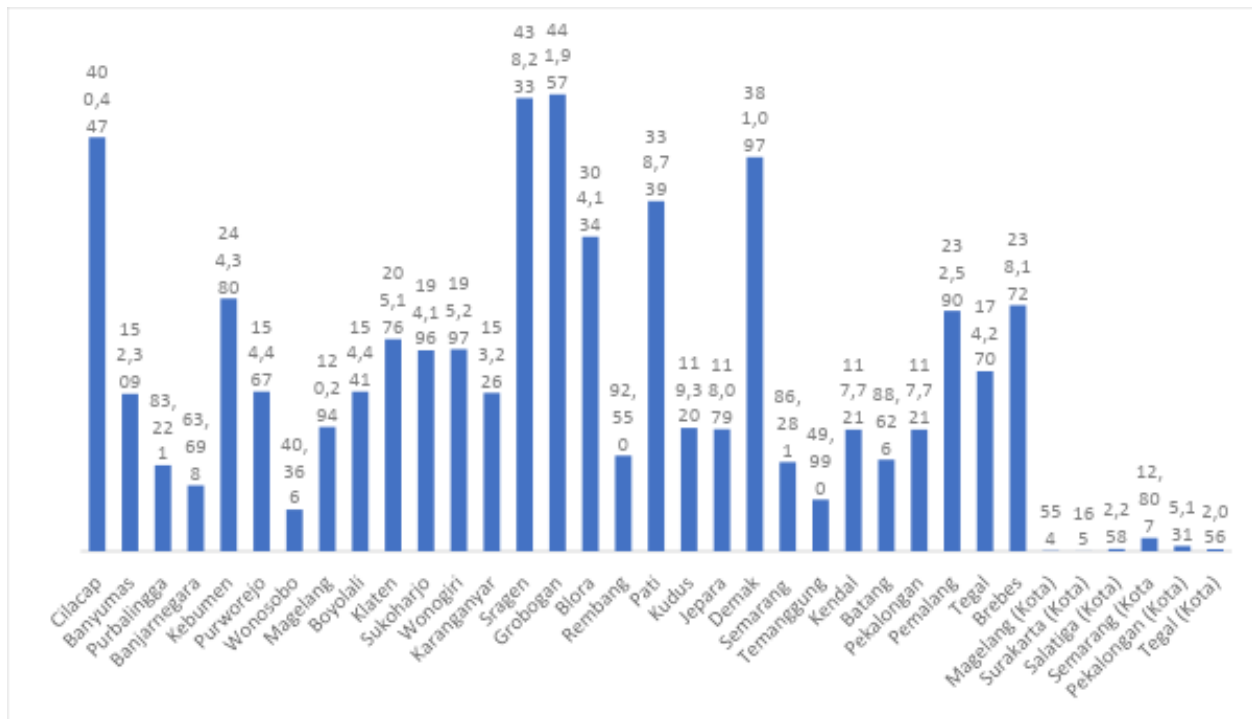


Figure 2. Central Java District/City Rice Production in 2019

In 2020, total rice production was recorded at 5,456,832 tons, with the largest composition contributed by Grobogan with 463,578 tons and the lowest by Surakarta (Kota) with 139 tons. The top three contributors to district/city rice production in 2020 are Grobogan (463,578 tons), Cilacap (456,543 tons) and Sragen (411,082 tons). Meanwhile, the lowest rice production is in Tegal (City) with a total production of 1,199 tons, Magelang (City) with a total production of 542 tons and Surakarta (City) with rice production of 139 tons. Rice production in 2020 can be seen in Figure 3.

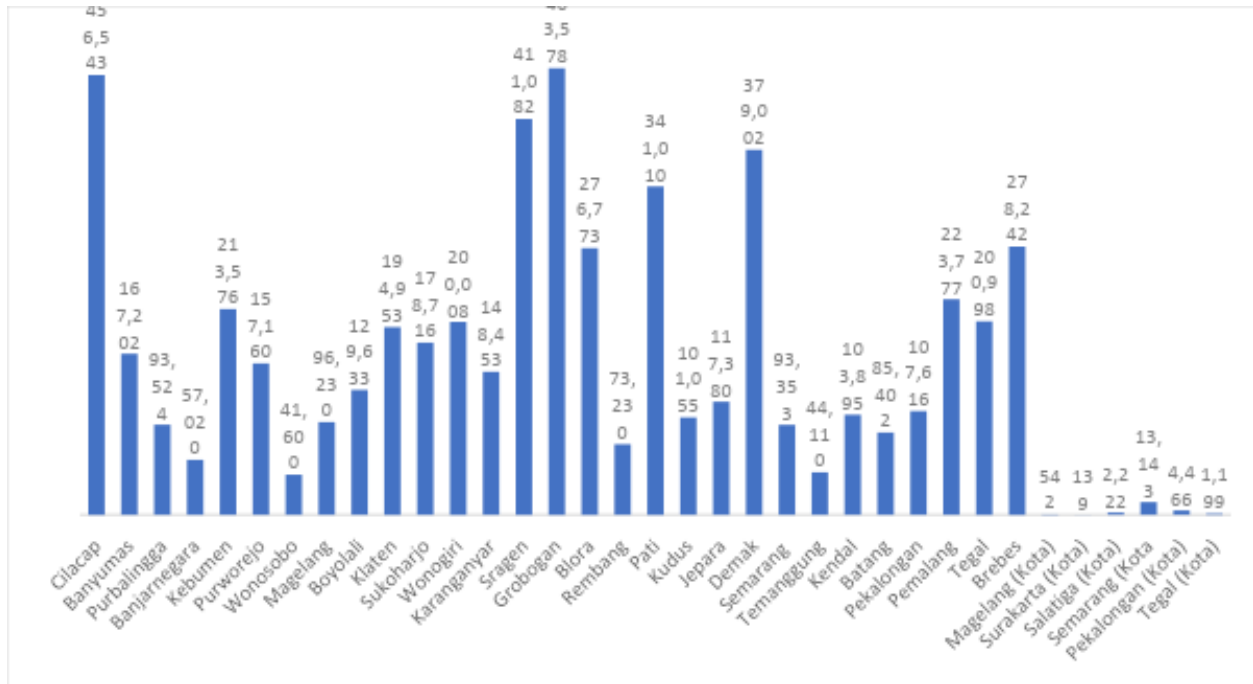


Figure 3. Central Java District/City Rice Production in 2020

Year 2021 was recorded as the second largest total rice production of 5,513,297 tons of rice. This total production is supported by Grobogan, Sragen and Cilacap as the largest rice production producers with total production of 460,591 tons, 427,311 tons and 425,049 tons. From the top three regencies/cities, it was recorded that only Sragen experienced an increase in rice production compared to the 2020 period of 16,229 tons of rice. The district/city that contributed the lowest production during 2021 was Surakarta (city) with 104 tons of rice. Tegal (city) and Magelang (city) are also the districts/cities with the lowest rice production in 2021.

Rice production in 2022 showed a decrease in production compared to 2021. This is reflected in the number of district/city rice production which also shows a decrease. Grobogan, Cilacap and Sragen dominate the largest rice production in 2022. However, Grobogan and Sragen experienced a significant decline in rice production. Rice production in Grobogan in 2022 decreased by 12,680 tons compared to 2021, and Sragen also experienced a decrease in rice production by 64,698 tons, only Cilacap was able to increase rice production by 10,514 tons in 2022. The lowest rice production was contributed by Tegal (city), Magelang (city) and Surakarta (city) with total production of 1,849 tons, 417 tons and 78 tons. For a clearer view, refer to Figure 4 and Figure 5 below.

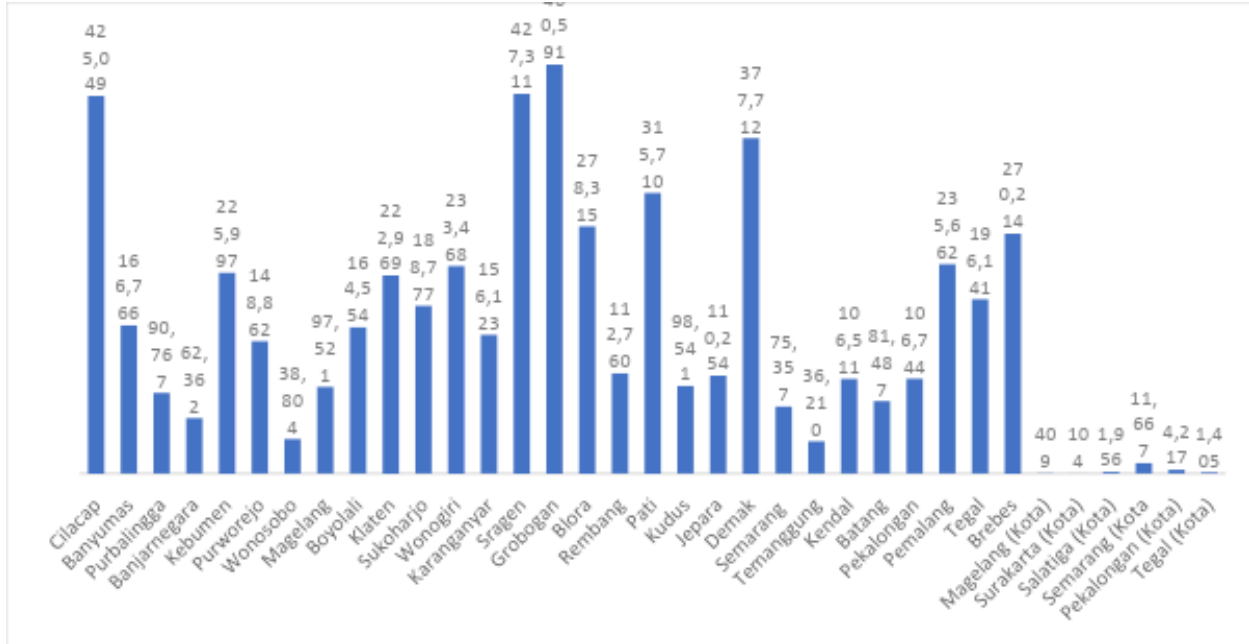


Figure 4. Central Java District/City Rice Production in 2021

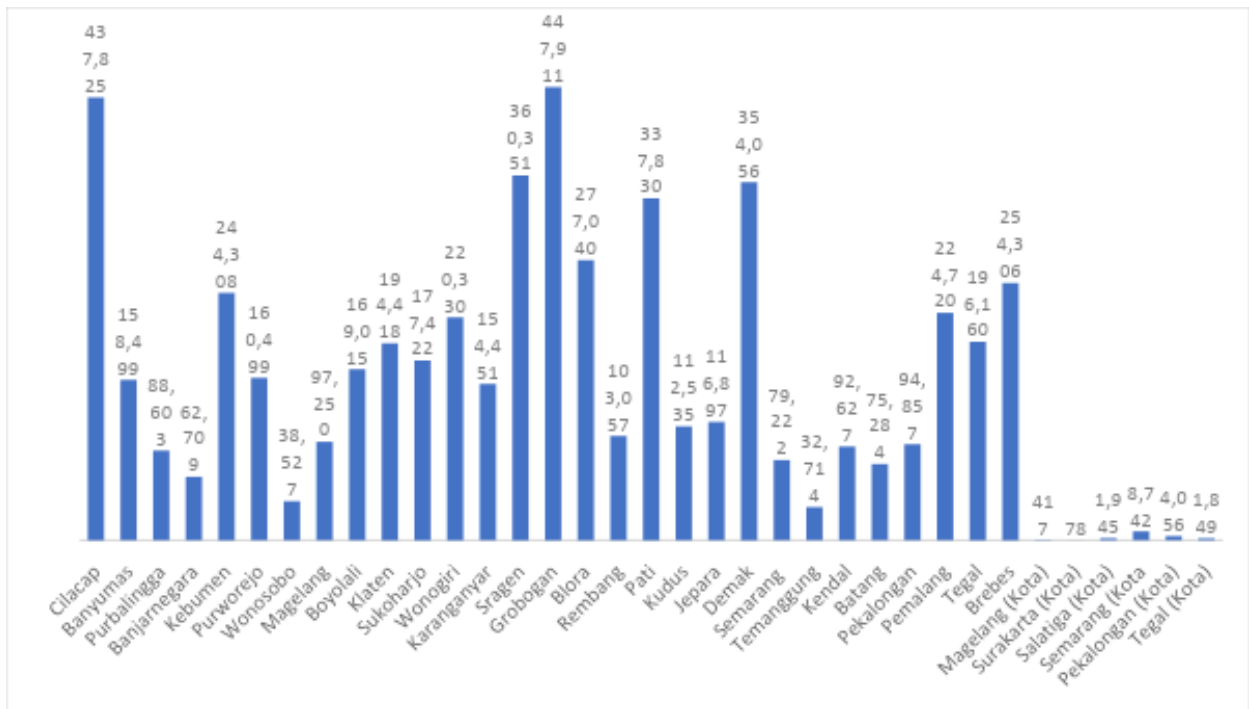


Figure 5. Central Java District/City Rice Production in 2022

To see the difference in rice production before, during, and after COVID-19, Wilcoxon Signed Rank Test is carried out and it can be seen in Table 1. Based on the Wilcoxon Test, three conditions were obtained to check the difference in rice production. The first condition is focused on rice production before and during COVID-19 pandemic. After the analysis was conducted, it was found that the value of Asymp.Sig was 0.025. This value is less than 0.05 indicating that there was no difference in rice production in the period before and during COVID-19. The second condition is



during and after COVID-19, which shows an Asymp.Sig value of 0.001. The Asymp.Sig value in the second condition shows a value smaller than 0.05 ( $0.001 < 0.05$ ) so there is no difference in rice production during and after COVID-19. The third condition is before and after COVID-19. Asymp.Sig obtained 0.145 and greater than 0.05 so that there is a difference in rice production before COVID-19 and after COVID-19.

Table 1. Wilcoxon Signed Rank Test  
Test Statistics<sup>a</sup>

Period of COVID-19 pandemic	Asymp. Sig. (2-tailed)
Before-During	0,025
During-After	0,001
Before-After	0,145

## 5. Discussion

COVID-19 has had a significant impact on all aspects of the economic sector, including the agricultural sector. As one of the outputs of the strategic agricultural sector, rice plays a role in supporting food security. The process of maintaining food security can be focused on the availability of rice production for the entire community so that there is no shortage of rice in the market (Be, 2022). The data presented in the background above, rice production from 2019 to 2022 showed that in 2020 it decreased quite significantly, this caused by the allocation of income expenditure for the Indonesian population is used for processed food and beverages by 34.27%, then cigarettes 12, 17%, meanwhile, grains which are the raw material for rice occupy the third position with a percentage of 11.07%. In 2020, the expenditure pattern of the Indonesian population underwent a change, where processed food and grains experienced a reduction, while the highest expenditure in 2020 was in the vegetables and fruits group which reached an average of 19.78% and 9.74% compared to 2019. The decline in grain stocks and the increase in the vegetables and fruits was due to the COVID-19 pandemic, where people are aware of the need to increase immunity by consuming more healthy food ingredients such as vegetables and fruits. Another commodity that experienced an increase was spices. This also indicates that the consumption of spices included in the seasoning category, such as ginger, has increased during the COVID-19 pandemic (Kementerian Pertanian Republik Indonesia, 2021).

At the beginning of the pandemic, rice production in Central Java had experienced the largest increase in April 2020 but immediately dropped significantly in May 2020 and decreased further from August to December 2020 (BPS, 2021). This caused by the farmers were still frantic due to the beginning of the pandemic conditions in Indonesia and there were still many issues circulating in the community about the virus. Many people have reduced the intensity of meetings, but the agricultural process, especially rice, continues to run even with some adjustments (Wahyudi et al., 2021). Furthermore, Wahyudi et al. (2021) stated that one of the impacts of this pandemic is subsidized fertilizer which is quite difficult to find and directly impacts on the farming process, especially rice production.

Rice production increased again in 2021, with rice production reached the highest in March 2021 and the lowest in January 2021. The lowest production in January 2021 was due to the impact of

the decline in rice production in 2020. However, rice production increased in the following months which was able to stimulate overall rice production in 2021. Basically, this improvement was mainly because of the efforts of the Central Java Provincial government by focusing on agricultural intensification and extension by using high-productivity superior seeds, using agricultural technology mechanization technology consistently, empowering Agricultural Instructors in assisting cultivation technology and Observer of Plant Pest Organisms (POPT), and paying attention to water availability in order to anticipate dry periods (Pemprov Jateng, 2023).

Research conducted by Elrina and Elbaar (2021) shows that the COVID-19 pandemic has had an impact on distribution and supply chain processes, and has not had much of an impact on agricultural processes. This condition supports rice production in Central Java to remain high and makes Central Java one of the rice production centers in Indonesia (Erlina & Elbaar, 2021). In 2022, rice production was recorded to decrease compared to 2021. According to Karjono (2022), this situation is due to the difficulty of obtaining fertilizers, pests, and weather conditions, especially increased rainfall in Central Java (Karjono, 2022). Research by Dhamira and Irham (2020) states that one of the most influential factors in rice production is weather conditions that always change erratically. This condition shows a difference in rice production during the study period before and after COVID-19 (Dhamira & Irham, 2020).

This result is confirmed by research that the impact of COVID-19 on the food corps apparently does not show any significant difference from the behavior of farmers and rice supply (Wisnujati & Noerhartati, 2020). Additionally, this result is also supported by research (Wahyudi et al., 2021) which shows that COVID-19 only has an impact on the fertilization process and post harvest. And lastly, this result is highlighted in the research by (Sunandar et al., 2021) who stated that increasing production after COVID-19 can be focused more on increasing rice productivity and agricultural intensification by using appropriate technology for the rice production process.

## **6. Conclusion**

Rice production in Central Java experienced fluctuations from 2019 to 2022. It experienced a decline in production in 2020 and 2022. During the observation period, the districts/cities that dominated rice production: Grobogan, Cilacap and Sragen. However, there were also regencies/cities that had the lowest contribution to total rice production in Central Java: Tegal (city), Magelang (city) and Surakarta (city).

The Wilcoxon Signed Rank Test was conducted with simulations of three conditions: before, during, and after COVID-19. From the test, it was obtained that the before-during period and during-after period have no significant difference in rice production in Central Java. However, there was a significant difference in rice production in Central Java in the period before and after COVID-19 pandemic.

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