

Analysis of the Productivity of Hybrid Corn Variety Bisi 2 in Buleleng Village, Bungku Pesisir Subdistrict, Morowali Regency, Central Sulawesi Province

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Abstract

The purpose of this study was to determine: how much is the productivity of hybrid corn variety bisi 2 in Buleleng Village, Bungku Pesisir District, Morowali Regency, Central Sulawesi Province and what factors influence the productivity of hybrid corn variety bisi 2 in Buleleng Village, Bungku Pesisir District, Morowali Regency, Central Sulawesi Province. The population in this study were all corn farmers in Buleleng Village, totaling 36 people. This study used a census method, where the entire population was used as a sample. Data were analyzed using a multiple non-linear regression formula transformed into a Cobb Douglas function. The results of this study indicate that the factors that affect the productivity of hybrid corn bisi 2 are farming experience X1 with a significant value of 0.041, the use of technology X2 with a significant value of 0.015, and the use of seeds X3 with a significant value of 0.002.

Keywords: Hybrid Corn, Production and Productivity

INTRODUCTION

Indonesia is an agrarian country with the majority of its population dependent on the agricultural sector for their livelihood. Agriculture is one of the important pillars of development and a significant contributor to national income. One of the strategic commodities that plays a major role in the development of the agricultural sector is corn.

Globally, corn ranks third as a staple food after wheat and rice. In Indonesia, corn is the

second staple food after rice. In addition to being a source of carbohydrates for humans, corn is used as feed for livestock and as a raw material for the food, beverage, flour, and oil industries (Chotimah et al., 2019). Given its strategic role, increasing corn production is an important priority. Data from the Central Statistics Agency (2023) indicates that Central Sulawesi Province is one of Indonesia's major corn-producing regions. However, during the 2021–2023 period, there was a decline in corn harvest area, production, and productivity in this region, as shown in Table 1 below:

Table 1. Total Harvest Area, Production, and Productivity of Central Sulawesi Province in 2021-2023

Year	Harvested Area (ha)	Production (tons)	Productivity (tons/ha)
2021	14152,43	63514,84	44,88
2022	22349,74	96199,79	43,04
2023	18065,17	75939,66	42,04

Based on the table, it can be seen that in 2022, the harvested area reached 22,349.74 ha with a productivity of 43.04 tons/ha. However, in 2023, the harvested area decreased to 18,065.17 ha and productivity declined to 42.04 tons/ha. This decline resulted in a total corn production of only 75,939.66 tons in 2023. This condition indicates the need for efforts to increase corn productivity in Central Sulawesi Province.

One of the corn-producing areas in Central Sulawesi is Buleleng Village, Bungku Pesisir Sub-district, Morowali District. This village has significant agricultural potential, with the majority of its population engaged in farming. The corn cultivated in this village is partially used as livestock feed, while the majority is sold as a source of income.

The Bisi 2 hybrid corn variety is the top choice for farmers because it is easily available and relatively affordable. According to local farmers, this variety produces good yields, but its productivity has not been consistent from year to year. Productivity, defined as the ratio of output to input, is influenced by various production factors, including land area (Rarun, 2023). The larger the area planted, the greater the potential yield, and vice versa. Bisi 2 hybrid corn seeds are the result of breeding that has proven to produce 15% higher yields compared to open-pollinated corn. However, hybrid seeds are relatively expensive, making their use an economic consideration for farmers (Fitriyani, 2024). In addition to seeds and land area, the use of other production inputs such as fertilizers, labor, and cultivation management also influence productivity (Fermadi et al., 2015).

Based on these conditions, it is important to conduct research to determine the productivity of Bisi 2 hybrid corn in Buleleng Village and the factors that influence it. The results of this study are expected to provide practical recommendations for efforts to increase the productivity and sustainability of hybrid corn farming in the area.

METHOD

This study was conducted in Buleleng Village, Bungku Pesisir Subdistrict, Morowali District, Central Sulawesi, from October 2024 until completion. The location was selected purposively because this village cultivates more Bisi 2 hybrid corn than other villages in the subdistrict. The population in this study consisted of all corn farmers in Buleleng Village, totaling 36 individuals. Due to the small population size, this study employed a census method, where the entire population was used as the sample using a saturated sampling technique.

Data collection techniques in this study were conducted through observation, namely direct observation of the research objects in the field; interviews with corn farmer respondents using questionnaires or prepared lists of questions; and documentation in the form of relevant archives or written documents, including photos of the research location and corn farmer activities. The variables in this study are factors influencing the productivity of hybrid corn variety Bisi 2 as independent variables (x): farming experience (years), technology use (units), seed use (kg/ha), and age (years). Dependent variable (Y): Hybrid corn productivity of the Bisi 2 variety (kg/ha)

The data analysis method used in this study is to measure the level of corn productivity for feed and to test the factors influencing productivity, as follows:

1. Hybrid corn productivity of the Bisi 2 variety, the data analysis method used is quantitative descriptive. The formula for calculating productivity is as follows:

$$Productivity = \frac{Production (kg)}{Lan Area (Ha)}$$

Notes:

Production = harvest yield (kg)

Area = land area (Ha)

2. *Cobb-Douglass* analysis with quantitative descriptive methods. This quantitative approach uses the *Cobb-Douglass* function to identify the factors influencing the productivity of hybrid corn variety Bisi 2.

$$Y = Ax_1^{b_1} x_2^{b_2} x_i^{b_i} \dots x_n^{b_n} e^u$$

To estimate the parameters of the *Cobb-Douglas* function equation, it must first be converted into a multiple linear regression form, as follows:

$$Y = a^{X_1} b_1^{X_2} b_2^{X_3} b_3^{X_4} b_4 e$$

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + \dots + b_n \ln X_n + e$$

Notes:

Y = hybrid corn productivity of variety Bisi 2

X = farming experience (years), technology use (units), seed use (kg), age (years)

a = constant

b = regression coefficient value for each variable

e = error term

The factors influencing the productivity of hybrid corn variety Bisi 2 are as follows:

1. Farming experience X_1 (years)
2. Use of technology X_2 (units)
3. Seed Use X_3 (kg)
4. Age X_4 (years)

Where Y is corn productivity (kg/ha), (X_1) is farming experience, (X_2) is technology use (units), (X_3) is seed use (kg), and (X_4) is age (years). β is the regression coefficient for each factor, which also indicates the elasticity of productivity, and e is the error. To determine the influence of productivity factors and explain the productivity of hybrid corn Bisi 2, several tests were conducted, including classical assumptions and hypothesis testing.

RESULTS AND DISCUSSION

Hybrid Corn Farming of Bisi 2 Variety

The hybrid corn farming of the Bisi 2 variety in this study includes land area, production and productivity, technology use, and seed quantity. For further details, please refer to Table 2 below:

Table 2. Hybrid Corn Farming of Bisi 2 Variety in Buleleng Village, Bungku Pesisir Subdistrict, Morowali District, 2024

Description	Land Area (Ha)	Production (kg)	Productivity (kg/ha)	No. of Technologies (Units)	No. of Seeds (kg)
Highest	3	17.100	8.500	12	55
Lowest	1	3.100	2.550	3	14
Average	2	8.983	5.107	8	36

Based on Table 2 above, the hybrid corn farming conducted in Buleleng Village can be explained as follows;

1. Land area in hectares based on the three main measurements: the largest, the smallest, and the average. The largest recorded land area is 3 hectares, while the smallest is only 1 hectare. The average of all available data is 2 hectares. The results of the data analysis indicate that land sizes vary between 1 and 3 hectares, with no plots smaller than 1 hectare or larger than 3 hectares. The average value in the middle suggests that land sizes are fairly evenly distributed within this range. The area of land used for hybrid corn production in Buleleng Village, as indicated by the research findings, is still considered small. The research results indicate that land area influences productivity because larger land areas allow for large-scale planting, which can increase crop yields. According to Koruwu (2022), land area influences productivity because the larger the area, the higher the production output.
2. The highest recorded production reached 17,100 kg, which was the largest yield. Meanwhile, the lowest production was only 3,100 kg, indicating the smallest yield achieved or the least production. Looking at the average of all data, production generally stands at 8,983 kg, meaning that most of the production is around that figure, although there are variations between the highest and lowest values. Overall, production ranged from 3,100 kg to 17,100 kg, with no values lower or higher than this range. The average indicates that despite differences in harvest yields, most production remained within the middle of the range. The better the production factors, the better the harvest yields achieved. According to Fadhilah and Rochdiani (2021), the available agricultural production factors will determine the extent to which agricultural productivity can be achieved.
3. The highest productivity recorded is 8,500 kg/ha, indicating the maximum yield per hectare. Conversely, the lowest productivity recorded is 2,550 kg/ha, indicating the smallest yield in the data. If we look at the average of all available data, productivity generally stands at 5,107 kg/ha. From the research results, it can be seen that productivity varies between 2,550 kg/ha and 8,500 kg/ha, with no values lower or higher than this range. With an average of 5,107 kg/ha, it can be said that most land produces yields around this figure, although there are some that are higher or lower.
4. The highest number of technologies recorded was 12 units, indicating that there are farmers or those in the production process using the most technology. Conversely, the lowest number of technologies recorded was 3 units, indicating that farmers use the least

technology. The average technology use among farmers is generally around 8 units. The use of good technology can influence corn productivity. In the processing stage, the more modern the technology used, the faster the land preparation and planting processes, thereby reducing time and labor, resulting in higher production yields. According to Sugiantara and Utama (2019), this influences productivity because the more modern the technology used, the higher the production yields achieved.

5. The highest recorded seed usage is 55 kg, indicating that there are farmers with the highest seed usage. Conversely, the lowest recorded seed usage is 14 kg, indicating the lowest seed usage. If we look at the average of all data, the amount of seed used is generally around 36 kg. From the research data, it can be seen that the amount of seeds used ranges from 14 kg to 55 kg, with no values lower or higher than this range. The average is 36 kg. Improved seed usage will impact corn farming productivity. According to Kamaruddin, *et al.*, (2022), productivity influences agricultural productivity.

The Influence of Farming Experience, Technology, Seed, and Age on Corn Productivity

Productivity is influenced by various production factors such as farming experience, technology use, seed use, and age on the productivity of hybrid corn variety Bisi 2. The better the management of these factors, the higher the corn yield.

To analyze the factors influencing the productivity of hybrid corn variety Bisi 2 in Buleleng Village, Bungku Pesisir Subdistrict, Morowali District, Central Sulawesi Province, a multiple linear regression model was used, which passed the classical assumption tests (normality test, multicollinearity test, and heteroskedasticity test), as presented in Table 3.

Table 3. Results of Regression Analysis of Factors Influencing the Productivity of Hybrid Corn Variety Bisi 2 in Buleleng Village, Bungku Pesisir Subdistrict, Morowali Regency, Central Sulawesi Province

Variable	Regression Coefficient	T-statistic	Significance	Description
Constant	6,147	13,947	0.000	
Farming Experience (X_1)	0,346	2,134	0.041	Significant
Use of Technology (X_2)	0,370	2,582	0.015	Significant
Seed Use (X_3)	0,222	3,381	0.002	Significant
Age (X_4)	0,002	0,018	0.986	Not significant
Adjusted R^2			0.724	

R (Correlation Coefficient)		0.869	
F value		23,940	
F significance		0,000	

The data above is written in a mathematical model as follows:

$$\ln Prod = 6.147 + 0.346X_1 + 0.370X_2 + 0.222X_3 + 0.002X_4$$

Based on Table 3, the regression analysis results indicate that the model used is quite effective in explaining the factors influencing the productivity of hybrid corn variety Bisi 2. With an Adjusted R² of 72.4%, this means that the model is able to explain most of the variation in the dependent variable (hybrid corn productivity of the Bisi 2 variety), while the remaining 24.5% is influenced by factors outside the model. Additionally, the correlation coefficient (R) value of 0.869 indicates a strong relationship between the variables tested. The F-test, which produced a value of 23.940 with significance of 0.000, also confirms that this model is valid and can be used for further analysis.

Based on the results of multiple regression analysis, the factors influencing corn productivity for feed in Buleleng Village, Bungku Pesisir Subdistrict, Morowali District, Central Sulawesi Province can be concluded as follows:

1. Farming Experience (X₁), the research results tested with multiple linear regression show that the regression coefficient for farming experience is 0.346 and the t-value is 2.134 with a significance level of 0.041. This indicates that the significance level of 0.041 is < 0.05, indicating that the farming experience variable influences the productivity of hybrid corn Bisi 2. According to field research results, farming experience influences productivity because farmers' experience provides knowledge that facilitates the production process, thereby increasing productivity. Thus, it can be interpreted that every 1% increase in farming experience will increase productivity by 0.346%. The results of this study are consistent with the research by Artanegara *et al.* (2016), which showed that farming experience has a positive and significant effect on farmer productivity. This is because the more farming experience farmers have, the higher their productivity will be, as extensive experience enables people to work more effectively and efficiently. Research by Fadzim *et al.* (2016) shows that farmers' experience can influence productivity.
2. The use of technology (X₂) shows that the regression coefficient of the technology use factor is 0.370 and the t-value is 2.582 with a significance level of 0.015. This indicates that



the significance level is $0.000 > 0.05$, so it can be said that the variable of technology use has a large and significant effect on the productivity of Bisi 2 hybrid corn. According to the results of field research, the use of technology has a positive effect on productivity because the more or greater the amount of technology used, the higher the productivity of Bisi 2 hybrid corn. Therefore, it can be concluded that for every 1% increase in technology use, productivity increases by 0.370%. From the perspective of the technology used, the more modern the technology, the greater the production output achieved in an effective and efficient manner (Irawan and Suparmoko, 1983). This study aligns with the research by Ali (2017), who stated that the use of technology influences productivity.

3. The use of seeds (X_3) is known to have a regression coefficient of 0.222 and a calculated t-value of 3.381 with a significance level of 0.002. This indicates that the significance level is $0.000 < 0.05$, meaning that the seed variable influences productivity, or in other words, better or higher-quality seed use directly increases production output. These results indicate that seed use is an important factor in increasing productivity. Therefore, it can be concluded that every 1% increase in seed use will increase corn productivity by 0.222%. This study is also in line with Kamaruddin *et al.* (2022), who stated that seeds partially affect agricultural productivity.
4. Age (X_4) is known that the age variable (X_4) does not have a significant effect on the productivity of hybrid corn Bisi 2. This is indicated by a significance value of 0.986, which is much greater than the significance threshold of 0.05. In other words, there is insufficient statistical evidence to state that age affects corn productivity. Thus, from the results of the regression model analyzed, it can be concluded that the age factor does not have a significant contribution in determining corn productivity. This is consistent with field research, which found that age does not affect productivity because harvest success is more determined by the application of appropriate agricultural technology and external factors such as weather conditions and soil fertility. Every 1% increase in age will increase corn productivity by 0.002%. Therefore, although age may influence other aspects such as work efficiency or the ability to adopt agricultural technology, it does not directly have a significant impact on corn harvest yields. This aligns with Susilawati's (2022) research, which states that age does not affect productivity because most corn farmers fall into the category of older, non-productive age groups who rely solely on experience, leading to decreased productivity.





CONCLUSION

Based on the research findings, it can be concluded that the productivity of hybrid corn variety Bisi 2 in Buleleng Village, Bungku Pesisir Sub-district, Morowali District, Central Sulawesi Province, with an average productivity of 5,107 kg/ha and an average production of 8,983 kg/ha.

The results of the analysis of the influence of farming experience, technology use, seed use, and farmer age on the productivity of hybrid corn variety Bisi 2 in Buleleng Village indicate that farming experience, technology use, and seed use have a positive and significant influence on the productivity of hybrid corn variety Bisi 2.

Based on the research conclusions, it is recommended that farmers enhance their skills and knowledge in hybrid corn cultivation through training and by sharing experiences with more experienced farmers to improve productivity. The agricultural department should conduct evaluations and provide guidance on technology and seed use, accompanied by more intensive extension programs and technical assistance to enable farmers to adopt appropriate technologies and obtain high-quality seeds suited to local agroecological conditions. Furthermore, future researchers are encouraged to conduct further studies on the factors influencing hybrid corn productivity and examine more efficient and sustainable agricultural practices to enhance production outcomes in the future.

REFERENCE

- Ali A. 2017. Pengaruh teknologi pertanian terhadap produktivitas hasil panen padi di kecamatan maritengngae kabupaten Sidenreng Rappang. *AKMEN Jurnal Ilmiah*, 14(3).
- Artanegara, Made, Setiawina D, Nyoman, Djayastra, & Ketut. 2016. Kajian Faktor Sosial Ekonomi yang Mempengaruhi Produktivitas Petani Asparagus di Kecamatan Petang Kabupaten Badung. *E-Jurnal Ekonomi dan Bisnis Universitas Udayana*, 5(11), 3741-3764.
- Bps. 2023 Luas Panen, Produksi, dan Produktivitas Jagung Menurut Provinsi, 2022-2023. Diakses 1 September 2024
- Chotimah K, Baruwadi M, & Bakari Y. 2019. Analisis Efisiensi Usahatani Jagung Di Kecamatan Randangan Kabupaten Pohuwato. *Agrinesia: Jurnal Ilmiah Agribisnis*, 3(3), 174-182.
- Fadhilah M., & Rochdiani, D. 2021. Analisis Pendapatan Petani Usahatani Manggis di DesaSimpang Sugiran Kecamatan Guguk Kabupaten Limapuluh Kota. *Mimbar Agribisnis: Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, Vol.7(1): 796-804.
- Fadzim, Roshidah W, Aziz, Azman M.I, Mat, Hadijah S, Maamor, & Selamah. 2016. *Factors Affecting Efficiency of Smallholder Cocoa Farmers: A Tobit Model Application in Malaysia*.





- International Journal of Economics and Financial Issues*, 6(7), 115-119.
- Fermadi O, Prasmatiwi F. E, & Kasymir E. 2015. Analisis efisiensi produksi dan keuntungan usahatani jagung di kabupaten ogan komering ulu timur sumatera selatan. *Jurnal Ilmu Ilmu Agribisnis: Journal of Agribusiness Science*, 3(1).
- Fitriyani. 2024. Produktivitas dan pendapatan petani jagung kuning (*zea mays L*) di Desa Marobea Kecamatan Sawerigadi Kabupaten Muna Barat. Universitas Halu Oleo
- Kamaruddin K., Pupitasari D., & Asmini A. 2022. Pengaruh Faktor Produksi Terhadap Peningkatan Produktivitas Sektor Pertanian (Studi Pada Masyarakat Petani di Kabupaten Sumbawa). *Jurnal Ekonomi & Bisnis*, 10(3), 380-390.
- Koruwu M., Managanta A. A., & Dewi E. S. D. 2022. Pengaruh karakteristik petani dan dukungan penyuluhan terhadap peningkatan produktivitas padi sawah. *Jurnal Pengkajian Dan Pengembangan Teknologi Pertanian*, 25(1), 83-95.
- Rarun G. B, Kathiandagho T. M, & Laoh O. E. 2023. Pengaruh Penggunaan Pupuk Bersubsidi Dan Luas Lahan Terhadap Jumlah Produksi Jagung Di Desa Watudambo Dua Kecamatan Kauditan (*The Effect Of Subsidized Fertilizer Use and Land Area On The Total Corn Production In Watutambo Dua Village, Kauditan District*). *Journal Of Agribusiness And Rural Development (Jurnal Agribisnis Dan Pengembangan Pedesaan)*, 5(1), -32.
- Sugiantara I. G. N. M, & Utama M. S. 2019. Pengaruh tenaga kerja, teknologi dan pengalaman bertani terhadap produktivitas petani dengan pelatihan sebagai variabel moderating. *Buletin Studi Ekonomi*, 1.
- Susilawati. 2022. Pengaruh Program Bnatuan Benih Jagung Tehadap Produktivitas Jagung di Desa Mata Osole Kecamatan Wiwirano Kabupaten Konawe Utara. Universitas Halu Oleo

