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Growth Response and Soybean Production (*Glycine max* L. Merr) Variety Anjasmoro and Grobogan on Giving Dosesof Fertilizer KCl

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Abstract

This Research was conducted on the BSP (*Balai Seed Parent*) Tanjung Selamat land on Jl. Education with an altitude of ± 25 meters above sea level. This Research uses a Split Plot Design (SPD) using 2 factors. The aim is to determine soybean plants' response to KCl fertilizer doses. The main plot is Variety (V), which consists of V1 = Anjasmoro and V2 = Grobogan. Subplots are KCl fertilizer (P), which consists of P0 = Without KCl fertilizer, P1 = 100 kg/ha KCl (9.6 g/plot), P2 = 200 kg/ha KCl (19.2 g/plot), and P3 = 400 kg/ha KCl (38.4 g/plot). The results showed that the treatment of soybean varieties significantly affected plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, weight of seeds per plant, and weight of seeds per plot. Providing KCl fertilizer significantly affected plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot. The interaction between Variety and KCl fertilizer dose had no significant effect on plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot.

Keywords: Soybeans, Fertilizer, Seeds, Dosage

Introduction

Soybeans are a plant commodity and are a source of vegetable protein. Moreover, it can be processed into various food ingredients such as tofu, tempeh, soybean juice, and other foods most people in Indonesia consume (Nurhasan et al. 2022; Singh et al. 2021). The national demand for soybeans continues to increase due to the increasing use of soybeans for food, feed, and industry. The area harvested for soybeans in 2014 and 2015 decreased from 616,000

hectares (ha) to 614,000 ha. Soybean production in Indonesia in 2014-2015 increased from 955,000 tons to 963,000 tons. Based on data from the Central Statistics Agency (2017) 2017, the total supply of soybeans of 2.45 million tons used as a food ingredient reached 84.6 percent, while 15.4 percent was used other than food ingredients. As an illustration, tofu and tempeh production is a food ingredient that requires soybeans, amounting to two-thirds of Indonesia's total soybean supply (Colimoro et al. 2023; Indrawan, Alam, and Kastono n.d.; Mahdi and Suharno 2019; Steenbergen 2023).

The increasing national demand for soybeans indicates that soybean users are increasing Therefore, it is necessary to increase production (Harnisa, Pata, and Azisah 2021; Mahdi and Suharno 2019; Taherzadeh and Caro 2019). Increasing soybean production can be done through extensification and intensification and is more effective if soybeans are by local planting patterns. Harvest age is an important component in planting patterns. Early harvest soybeans, followed by high-yield productivity, broadly impact micro and macroeconomic improvements, including increasing farmers' income and saving the country's foreign exchange (Abidin 2022; Macedo et al. 2012; Moyo, Bah, and Verdier-Chouchane 2015).

The harvest age for soybean plants in Indonesia is very early, less than 70 days after planting (DAP), early (70 – 80 DAP), medium (81 – 85 DAP), deep (86 – 90 DAP), and very late (>90 DAP) (Buthelezi 2022; Laili 2023). Soybean plants have reached harvest age when > 90% of the pods are mature and have a light brown or brown color (Krisnawati and Adie 2021; Rauf and Fattah 2021). Soybean plants that are early harvest can avoid drought by developing their seeds, especially on land that usually lacks water or has a short growing season. Medium-late maturing soybean varieties are useful for areas that can only be planted twice a year . On the other hand, in areas that have adequate irrigation facilities, soybeans can be planted three times a year if soybean varieties are available with a harvest age of less than 80 days. Seeing the various advantages of early maturity varieties, efforts to improve the maturity of soybean plants are important, especially in tropical areas (Oktavianus, Hanafiah, and Bayu 2019; Sumiati Putri 2017).

The development of superior soybean varieties with an appropriate harvest age, high productivity, and other desired characteristics can be done through breeding activities (Nurisma 2016; Oktavianus, Hanafiah, and Bayu 2019; Saâ, Siagian, and Barmawi 2016). The challenge for developing early-maturing superior varieties in the future is improving the harvest characteristics of soybean plants in Indonesia. Therefore, it requires research steps to study its genetic parameters. Knowledge about the action of genes that control a character is very useful for breeders, especially regarding the effectiveness of implementing selection programs that will be used to obtain the desired character. In Indonesia, more needs to be done to improve the harvest age of soybean plants due to limited information examining harvest age from the plant breeding perspective (Oktavianus, Hanafiah, and Bayu 2019).

Research Method

This Research uses a Split Plot Design (RPT) using 2 factors. The main plot is Variety (V), which consists of V1 = Anjasmoro and V2 = Grobogan. The subplots are KCl fertilizer

(P) which consists of P0 = Without KCl fertilizer, P1 = 100 kg/ha KCl (9.6 g/plot), P2 = 200 kg/ha KCl (19.2 g/plot), and P3 = 400 kg/ha KCl (38.4 g/plot). The parameters of this Research are plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot. Analysis of variance was used to test the effect of treatment and the mean difference between treatments; honest significant difference tests, regression, and correlation were carried out at a test level of 5%.

Result/Findings

1. Plant Height

The results of the variance test on the effect of Variety and KCl fertilizer dose on plant height. The variance test results show that the variety treatment and KCl fertilizer dose significantly affected soybean plant height at all ages of observation. In contrast, the interaction between Both treatments had no significant effect on soybean plant height at all ages of observation. The table presents a test of the difference in the average height of soybean plants due to various treatments and KCl fertilizer doses.

Table 1. Average Plant HeightSoybeans Due to Varieties and Doses of KCl Fertilizer Treatment at Ages 3, 6, 9, and 12 Weeks After Planting

Treatment	Plant Height (cm)			
	3 WAP	6 WAP	9 WST	12 WST
Variety (V)				
V1	16.99b	31.65b	48.15b	59.01b
V2	16.36a	30.44a	43.69a	54.44a
KCl Fertilizer (P)				
P0	15.69a	28.17a	39.67a	47.67a
P1	16.68b	30.51b	46.51b	57.51b
P2	16.84b	32.00c	49.00c	61.50c
P3	17.49b	33.52d	48.52c	60.24c
V1P0	16.22	29,22	42.22	50.22
V1P1	16.90	30.90	47.90	58.90
V1P2	17,18	32.59	51.59	63.59
V1P3	17.68	33.90	50.90	63.34
V2P0	15,17	27.11	37.11	45.11
V2P1	16.46	30.11	45.11	56.11
V2P2	16.50	31.41	46.41	59.41
V2P3	17.30	33.13	46.13	57.13

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

Table 1 shows that the plant height between the treatment varieties is significantly different, where the Anjasmoro variety (V1) has significantly taller plants than the Grobogan Variety (V2).

The relationship between plant varieties and soybean plant height at 12 WAP is presented in Figure 1.

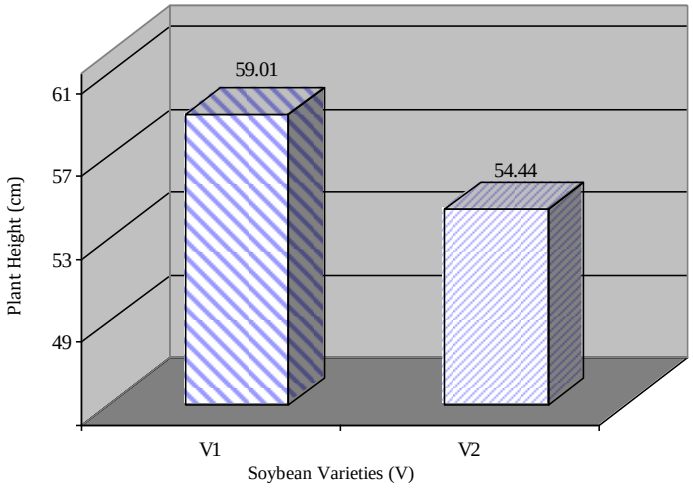

Figure 1. Relationship between Variety and height of soybean plants aged 12 weeks after planting

Figure 1 shows that the tallest plants in the Anjasmoro variety (V1) were significantly taller than the Grobogan Variety (V2). Table 3 shows that in the treatment with a dose of KCl fertilizer aged 3 WAP, the tallest plants found in treatment P3 were significantly different from P0, but not significantly different from P1 and P2. At the age of 6 WAP, the tallest plants were found in treatment P, significantly different from P0, P1, and P2. At the ages of 9 and 12 WAP, the tallest plants found in treatment P3 were significantly different from P0 and P1, but not significantly different from P2.

2. Number of Pods per Plant

Test resultsThe analysis of variance of the influence of Variety and dose of KCl fertilizer on the number of pods per plant. The results of variance show that the Variety of treatment and dose of KCl fertilizer have a significant effect on the number of pods per plant. In contrast, the interaction between the two treatments has no significant effect on the number of pods per plant. plant. In Table 4, a test of the difference in the average number of pods per soybean plant is presented due to a variety of treatments and KCl fertilizer doses.

Table 2. Average Number of Pods per Plant Due to Variety Treatment and KCl Fertilizer Dosage

Treatment	Number of Pods per Plant (fruit)

V1	32.47a
V2	33.40b
P0	31.07a
P1	32.78b
P2	34.78c
P3	33.11b
V1P0	31.00
V1P1	32.44
V1P2	33.89
V1P3	32.56
V2P0	31.14
V2P1	33.11
V2P2	35.67
V2P3	33.67

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

The table shows that the highest number of pods per plant is found in the Grobogan (V2) variety, significantly more than in the Anjosmoro (V1). The relationship between plant varieties and the number of pods per plant is presented in Figure 2.

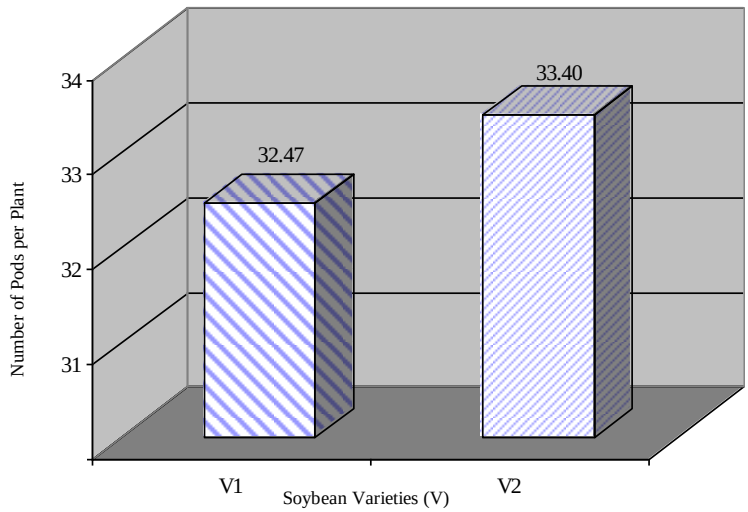

Figure 2. Relationship between Variety and Number of Pods per Plant

Picture 2 shows that the highest number of pods per plant is found in the Grobogan variety (V2), significantly more than in the Anjasmoro variety (V1). Table 2 also shows that in the KCl fertilizer dose treatment, the highest number of pods per plant was found in treatment P, significantly different from P0, P1, and P3.

3. Number of Seeds per Pod

Test results Characteristics of the influence of Variety and dose of KCl fertilizer on the number of seeds per pod. The results of variance analysis showed that the Variety of treatment and KCl fertilizer dose significantly affected the number of pods per pod. In contrast, the interaction between the two treatments had no significant effect on the number of seeds per pod.

Table 3 presents a test of the difference in the average number of seeds per soybean pod due to various treatments and KCl fertilizer doses.

Table 3. Average Number of Seeds per Plant Due to Variety Treatment and KCl Fertilizer Dosage

Treatment	Number of Seeds per Pod (Item)
V1	5.25a
V2	5.83b
P0	5.00a
P1	5,39ab
P2	5.72bc
P3	6.06c
V1P0	4.78
V1P1	5.00
V1P2	5.44
V1P3	5.78
V2P0	5.22
V2P1	5.78
V2P2	6.00
V2P3	6.33

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

Table 3 shows that the highest number of seeds per pod is found in the Grobogan (V2) variety, significantly more than the Anjosmoro (V1) variety. The relationship between plant varieties in the number of seeds per pod is presented in Figure 3.

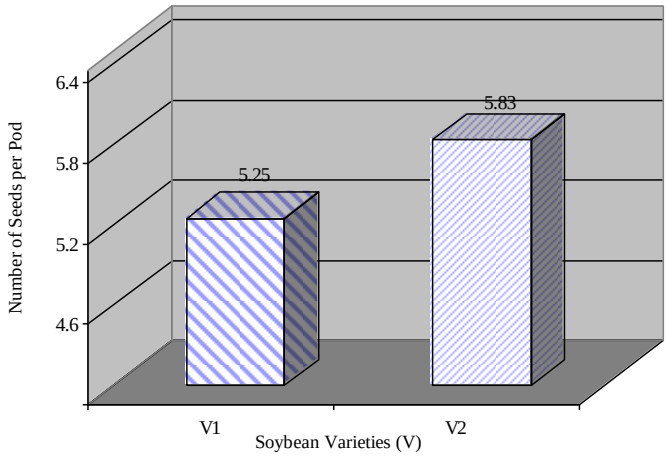

Figure 3. Relationship between Variety and QuantitySeeds per Pod

Picture 3 shows that the highest number of seeds per pod is found in the Grobogan variety (V2), significantly more than in the Anjasmoro variety (V1). Table 3 shows that in the KCl fertilizer dose treatment, the highest number of seeds per soybean pod was found in treatment P3, which was significantly different from P0 and P1 but not significantly different from P2. The number of seeds per pod in treatment P2 differed significantly from P0, but not significantly from P1. The number of seeds per pod in treatment P1 was not significantly different from P0.

4. Number of Seeds per Plant

Test results Characteristics of the influence of Variety and dose of KCl fertilizer on the number of seeds per plant. The results of variance analysis showed that the Variety of treatment and dose of KCl fertilizer significantly affected the number of seeds per plant. In contrast, the interaction between the two treatments had no significant effect on the number of seeds per plant. Table 4 presents a test of the difference in the average number of seeds per soybean plant due to various treatments and KCl fertilizer doses.

Table 4. Average Number of Seeds per Plant Due to Variety Treatment and Fertilizer DosageKCl

Treatment	Number of Seeds per Plant (Item)
V1	171.25a
V2	196.67b
P0	157.56a
P1	177.44b
P2	200.33c
P3	200.50c

V1P0	149.33
V1P1	162.67
V1P2	184.78
V1P3	188.22
V2P0	165.78
V2P1	192.22
V2P2	215.89
V2P3	212.78

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

Table 4 shows that the highest number of seeds per plant is found in the Grobogan (V2) variety, which is significantly more than the Anjosmoro (V1) variety. The relationship between plant varieties and the number of seeds per plant is presented in Figure 4.

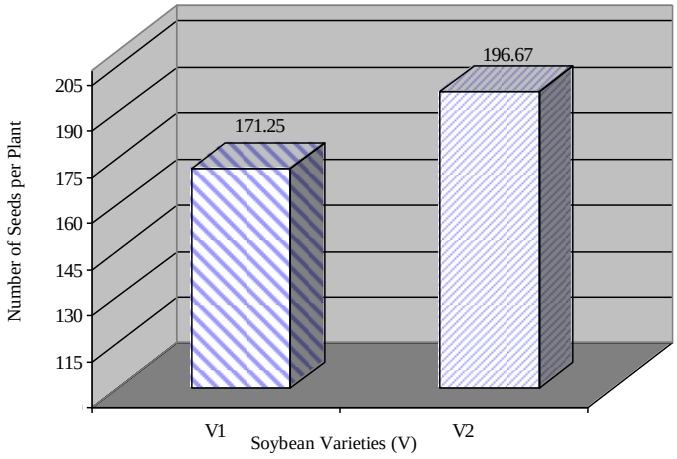

Figure 4. Relationship between Variety and QuantitySeeds per Plant

Picture 4 shows that the highest number of seeds per plant is found in the Grobogan variety (V2) significantly more than in the Anjasmoro variety (V1). Table 6 shows that in the KCl fertilizer dose treatment, the highest number of seeds per soybean plant was found in treatment P3, which was significantly different from P0 and P1 but not significantly different from P2. The number of seeds per soybean plant in treatment P2 significantly differed from P0 and P1. The number of seeds per soybean plant in treatment P1 significantly differed from P0.

5. Seed Weight per Plant

Test results Characteristics of the influence of Variety and dose of KCl fertilizer on seed weight per plant. The results of variance analysis showed that the Variety of treatment and dose of KCl fertilizer significantly affected seed weight per plant. In contrast, the interaction between the two treatments had no significant effect on seed weight per plant.

Table 5 presents a test of the difference in average seed weight per soybean plant due to various treatments and KCl fertilizer doses.

Table 5. Average Seed Weight per Plant Due to Variety Treatment and KCl Fertilizer Dosage

Treatment	Seed Weight per Plant (g)
V1	30.65a
V2	34.57b
P0	27.96a
P1	31.99ab
P2	36.15b
P3	34.33b
V1P0	26.19
V1P1	29.26
V1P2	33.26
V1P3	33.88
V2P0	29.73
V2P1	34.72
V2P2	39.04
V2P3	34.77

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

Table 5 shows that the heaviest seed weight per plant in the Grobogan (V2) variety is significantly heavier than the Anjosmoro (V1) Variety. The relationship between plant varieties and seed weight per plant is presented in Figure 5.

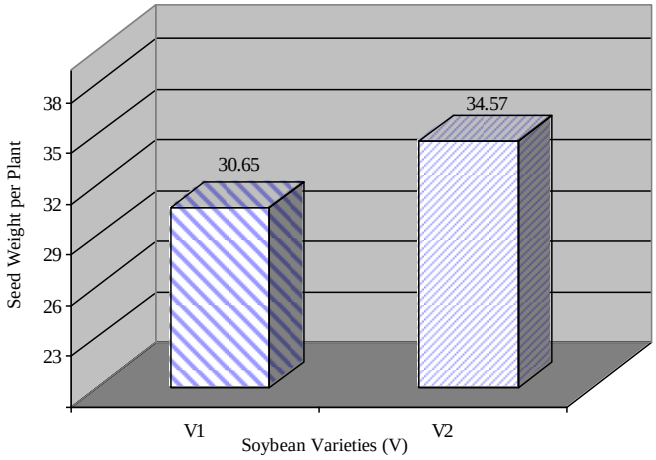

Figure 5. Relationship between Variety Indeed Weight per Plant

Picture 5 shows that the heaviest seed weight per plant found in the Grobogan variety (V2) was significantly heavier than the Anjasmoro variety (V1). Table 5 shows that in the KCl fertilizer dose treatment, the heaviest seed weight per soybean plant in treatment P2 was significantly different from P0 but not significantly different from P1 and P3. Seed weight per plant in treatment P3 was significantly different from P0, but not significantly different from P1. Seed weight per plant in treatment P1 was not significantly different from P0.

6. Seed Weight per Plot

Test results Characteristics of the influence of Variety and dose of KCl fertilizer on seed weight per plot. The results of variance analysis showed that the variety treatment and dose of KCl fertilizer had a significant effect on seed weight per plot, while the interaction between the two treatments had no significant effect on seed weight per plot. The table presents a test of the difference in average seed weight per soybean plot due to variety treatment and KCl fertilizer dose.

Table 6. Average Seed Weight per Plot Due to Variety Treatment and KCl Fertilizer Dosage

Treatment	Seed Weight per Plot (g)
V1	366.71a
V2	414.78b
P0	334.13a
P1	383.33ab
P2	433.72b
P3	411.81b
V1P0	311.56
V1P1	349.96
V1P2	398.96
V1P3	406.36
V2P0	356.71
V2P1	416.69
V2P2	468.48
V2P3	417.25

Information: Numbers followed by the same letter in a column and the same treatment group do not differ at the 5% test level.

Table 6 shows that the heaviest seed weight per plot is found in the Grobogan (V2) variety, which is significantly heavier than the Anjosmoro (V1) Variety. The relationship between plant varieties and seed weight per plot is presented in Figure 6.

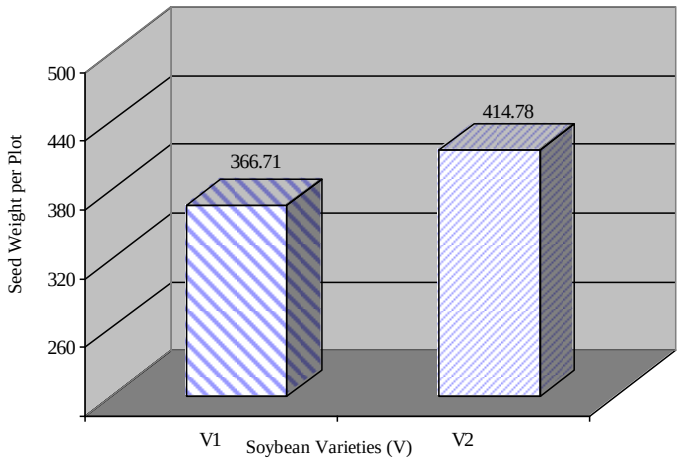

Figure 6. Relationship between Variety and Seed Weight per Plot

Picture 6 shows that soybeans' heaviest seed weight per plot is found in the Grobogan variety (V2), which is significantly heavier than the Anjasmoro variety (V1). Table 6 shows that in the KCl fertilizer dose treatment, the heaviest seed weight per plot of soybeans in treatment P2 was significantly different from P0, but not significantly different from P1 and P3. Seed weight per soybean plot in treatment P3 differed significantly from P0, but not significantly from P1. Seed weight per plot in treatment P1 was not significantly different from P0.

Discussion

1. InfluencePlant Varieties on the Growth and Production of Soybean Plants

The variance test results show that Variety significantly affects plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, the weight of seeds per plant, and weight of seeds per plot.

The results showed that the Anjasmoro soybean variety had a higher plant height compared to the Grobogan Variety. From the results of the plant description, it can be seen that the height of the Anjasmoro plant can reach 64 – 68 cm is much higher than the plant height of the Grobogan variety, which is 50 – 60 cm. (HASIBUAN 2022; Iqbal, Mawarni, and Charloq 2013) states that genetic and environmental factors interact with a particular environment so environmental factors can influence plant growth up to fruit ripening.

The research results also showed that the production of Grobogan variety soybean plants was higher than the Anjasmoro variety plant description shows that the Grobogan variety has a production potential of 3.40 tons/ha. The Anjasmoro variety has a production potential of 2.03 – 2.25 tons/ha. This is because the Grobogan variety soybeans are larger, with more seeds in each pod. The research results showed that the Grobogan Variety of soybeans had a production of 414.78 g/plot, while the Anjasmoro variety had a production of 366.71 g/plot. Each cultivar can adapt to environmental conditions. According to (Fox et al. 2019; Wardhani and Qomariah 2021), adaptation limits are a process where individual populations or species change their form or function to be able to live in certain environmental conditions.

The Grobogan variety has higher production compared to The size of the soybean seeds influences thiseds. According to (Kariya, Syamsuddin, and Hasanuddin 2022), in his writing, he divided the size of seeds into 3 categories, namely: small 6-10g/100 seeds), medium (11-12g/100 seeds), and large (larger than 13g/100 seeds). Environmental factors and cultivar growth determine crop production. Diverse environmental conditions require specific technology to increase crop production (Novitasari 2022).

Soybean production of the Grobogan Variety is higher than the Anjasmoro variety. This is caused by genetic factors, where the Grobogan variety soybean seeds have a higher protein and fat content compared to the Anjasmoro variety. Besides that, the Grobogan variety has a higher seed size and number of seeds per plant than the Anjasmoro variety. The plant adaptation process is divided into two, namely general adaptation and special adaptation. General adaptation is defined as the ability of a cultivar to quickly show its superior characteristics in various environments, while special adaptation is where the cultivar can only show its superior characteristics in certain environmental conditions. According to the explanation of (Muhammad n.d.; Suryadi et al. 2020; Yofa et al. 2021), which states that varieties play an important role in the development of soybean planting because achieving high productivity is largely determined by the potential yield of the superior varieties planted.

To find out the correlation coefficient between the observed parameters, see Table 9.

Table 9. Correlation Coefficient (r) between Observed Parameters Due to InfluenceVariety

Parameter	TT	JPT	JBP	J.B.T	BBT	BBP
TT	1					
JPT	0.99*	1				
JPB	0.66*	0.76	1			
J.B.T	0.99*	0.99*	0.76*	1		
BBT	0.99*	0.96*	0.53*	0.95*	1	
BBP	0.99*	0.99*	0.73*	0.99*	0.96*	1

Information :

r0.05 = 0.67

* =real

TT = High Plant J.B.T =Number of Seeds per Plant

JPT =Number of Pods per Plant BBT =Seed Weight per Plant

JBP =Number of Seeds per Pod BBP =Seed Weight per Plot

From Table 9, it can be seen that plant height is significantly positively correlated with the number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot. The number of pods per plant was significantly positively correlated with the number of seeds per pod, the number of seeds per plant, the weight of seeds per plant, and the weight of seeds per plot. The number of seeds per pod was significantly positively correlated with the number of seeds per plant, seed weight per plant, and seed weight per plot. The number of seeds per plant was significantly positively correlated with seed weight per plant and seed weight per plot. Seed weight per plant was significantly positively correlated with seed weight per plot.

2. Effect of Plant KCl Fertilizer Dosage on Growth and Production of Soybeans

The results of the variance test showed that the dose of KCl fertilizer had a significant effect on plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot.

Results Research shows that applying KCl fertilizer up to a dose of 26.63 g/plot produces a maximum soybean plant height of 63.14 cm. This is because administering a dose of KCl fertilizer of up to 26.63 g/plot can make the K element available enough in the soil to stimulate root growth. This better root growth will result in more nutrient absorption so that it can be used in metabolic processes, especially protein synthesis from amino acids and ammonium ions. The results of this synthesis can influence plant growth and production. According to (Guo et al. 2019; Morrow and Seprido 2019; Purba, Matondang, and Sari 2019), potassium has a special effect on the absorption of nutrients, regulation of respiration, transpiration, and enzyme work, and influences the translocation of photosynthesis.

Providing potassium at a dose of 26.36 g/plot produced a maximum number of seeds per plant of 34.21 seeds. This is because the availability of potassium in the soil is high.

Providing potassium fertilizer at a dose of (26.36 g KCl/plot) can increase the soybean plant's need for potassium nutrients so that it can increase the yield component compared to applying lower KCl fertilizer. Physiologically, giving potassium fertilizer can increase the number of pods and seeds in soybean plants by the mechanism of carbohydrate metabolism from photosynthesis. The physiological function of potassium is carbohydrate metabolism, namely the formation, breakdown, and translocation of starch in plant tissue, nitrogen metabolism, and protein synthesis. (Waluyo 2020; Xu et al. 2023) stated that potassium is an important element in the metabolism of proteins, carbohydrates, fats, and the transportation of carbohydrates from leaves to roots. Potassium is absorbed in the form of K+ and is mobile in plants. Potassium deficiency in the pod formation and seed filling phases can reduce the number of pods and seeds per plant. Photosynthetic activity decreases with decreasing potassium content by applying low doses of potassium fertilizer so that plant yields become low (Chen et al. 2021). (Sari, Pertami, and Eliyatiningsih 2022) states that potassium plays a role in synthesizing carbohydrates, fats, and photosynthesis. Lack of potassium content can reduce photosynthesis and the distribution of carbohydrates so that plant yields are low. Plants that lack potassium will cause low crop yields and quality (Hasibuan 2021; Ridwan and Hanifa 2020). To find out the correlation coefficient between the observed parameters, see Table 10.

Table 10. Correlation Coefficient (r) between Observed Parameters Due to InfluenceKCl Fertilizer Dosage

Parameter	TT	JPT	JBP	J.B.T	BBT	BBP
TT	1					
JPT	0.92*	1				
JPB	0.88*	0.70*	1			
J.B.T	0.95*	0.88*	0.95*	1		

BBT	0.97*	0.97*	0.86*	0.97*	1	
BBP	0.97*	0.97*	0.86*	0.97*	0.99*	1

Information :

r0.05 = 0.67

* =real

TT = HighPlant J.B.T =Number of Seeds per Plant

JPT =Number of Pods per Plant BBT =Seed Weight per Plant

JBP =Number of Seeds per Pod BBP =Seed Weight per Plot

Table 10 shows that plant height is significantly positively correlated with the number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot. The number of pods per plant was significantly positively correlated with the number of seeds per pod, the number of seeds per plant, the weight of seeds per plant, and the weight of seeds per plot. The number of seeds per pod was significantly positively correlated with the number of seeds per plant, seed weight per plant, and seed weight per plot. The number of seeds per plant was significantly positively correlated with seed weight per plant and seed weight per plot. Seed weight per plant was significantly positively correlated with seed weight per plot.

3. Effect of Interaction between Variety and Dosage of KCl Fertilizer on Growth and Production of Soybean Plants

ResultsAnalysis of variance showed that the interaction between Variety and KCl fertilizer dose had no significant effect on plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot.

Matter This is because the two varieties of soybean plants (Anjasmoro and Grobogan) have the same response to KCl fertilizer, where there are no differences in plant crowns which are not too different, so their response to fertilization is also relatively the same. Varietal differences influence plant appearance diversity due to differences in plant characteristics (genetics) or environmental influences. In agenetic composition, differences are one-factor causing diversity in plant appearance. Research by (Smercina et al. 2019) states that Variety greatly influences plant height and production but must also be supported by the availability of nutrients.

Conclusion

Variety significantly affect plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, the weight of seeds per plant, and weight of seeds per plot. The dose of KCl significantly affected plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot. The interaction between Variety and KCl fertilizer dose had no significant effect on plant height, number of pods per plant, number of seeds per pod, number of seeds per plant, seed weight per plant, and seed weight per plot.

References

Abidin, Zainal. 2022. *Paradigma Usaha Tani Tanaman Ternak Terintegrasi Optimal: Perspektif Sumber Daya Terbatas Dan Musim Berbeda*. Penerbit NEM.

Buthelezi, Zuzumuzi Sizwe. 2022. "Response of Primed Soybean (Glycine Max L.) to Storage Duration and Ambient Conditions."

Chen, Jianqiu et al. 2021. "Effects of Different Potassium Fertilizer Types and Dosages on Cotton Yield, Soil Available Potassium and Leaf Photosynthesis." *Archives of Agronomy and Soil Science* 67(2): 275–87.

Colimoro, Martina, Maddalena Ripa, Remo Santagata, and Sergio Ulgiati. 2023. "Environmental Impacts and Benefits of Tofu Production from Organic and Conventional Soybean Cropping: Improvement Potential from Renewable Energy Use and Circular Economy Patterns." *Environments* 10(5): 73.

Fox, Rebecca J et al. 2019. "Beyond Buying Time: The Role of Plasticity in Phenotypic Adaptation to Rapid Environmental Change." *Philosophical Transactions of the Royal Society B* 374(1768): 20180174.

Guo, Jiuxin et al. 2019. "Growth, Photosynthesis, and Nutrient Uptake in Wheat Are Affected by Differences in Nitrogen Levels and Forms and Potassium Supply." *Scientific reports* 9(1): 1248.

Harnisa, Harnisa, Abd Asis Pata, and Azisah Azisah. 2021. "Peranan Kelompok Tani Dalam Meningkatkan Produksi Usahatani Kedelai Di Desa Bulu Tellue Kecamatan Tondong Tallasa Kabupaten Pangkep." *Jurnal Agribis* 9(1): 63–80.

HASIBUAN, E K O SYUHENDRA. 2022. "PENGARUH PUPUK ANORGANIK TERHADAP PERTUMBUHAN DAN PRODUKSI BEBERAPA VARIETAS KEDELAI (Glycine Max L) DI BAWAH TEGAKAN TANAMAN KARET."

Hasibuan, Muktar Bukhori. 2021. "Pengaruh POC Bonggol Pisang Dan NPK Grower Terhadap Pertumbuhan Serta Produksi Tanaman Kacang Hijau (Vigna Radiata L.)."

Indrawan, Muhammad Haidar, Taufan Alam, and Dody Kastono. "Pengaruh Jenis Biochar Dan Pemupukan Urea Terhadap Pertumbuhan Dan Hasil Kedelai (Glycine Max (L.) Merr.) Pada Sistem Agroforestri Kayu Putih." *Vegetalika* 12(1): 1–11.

Iqbal, Muhammad, Lisa Mawarni, and Charloq Charloq. 2013. "Pertumbuhan Dan Produksi Beberapa Varietas Kedelai (Glycine Max L. Merrill) Pada Berbagai Tingkat Penaungan Tahap Kedua." *Jurnal Agroekoteknologi Universitas Sumatera Utara* 1(3): 95566.

Kariya, Kariya, Syamsuddin Syamsuddin, and Hasanuddin Hasanuddin. 2022. "Pengaruh Dosis Pupuk NPK Terhadap Pertumbuhan Dan Hasil Tanaman Kacang Tanah (Arachis Hypogea L)." *Jurnal Floratek* 17(1): 28–35.

Krisnawati, Ayda, and Muchlish Adie. 2021. "Agronomic Performance and Pod Shattering

Resistance of Soybean Genotypes with Various Pod and Seed Colors." *Biodiversitas Journal of Biological Diversity* 22(1).

Laili, Mardiah. 2023. "PEMANFAATAN PUPUK ORGANIK DAN PUPUK ANORGANIK TERHADAP PERTUMBUHAN DAN HASIL TANAMAN KEDELAI (Glycine Max)." *Agrosasepa-Jurnal Fakultas Pertanian* 1(1): 16–20.

Macedo, Marcia N et al. 2012. "Decoupling of Deforestation and Soy Production in the Southern Amazon during the Late 2000s." *Proceedings of the National Academy of Sciences* 109(4): 1341–46.

Mahdi, Naufal Nur, and Suharno Suharno. 2019. "Analisis Faktor-Faktor Yang Memengaruhi Impor Kedelai Di Indonesia." In *Forum Agribisnis: Agribusiness Forum*, , 160–84.

Morrow, Nindya Rezeki, and Seprido Seprido. 2019. "PENGARUH PUPUK BIOBOOST DAN PUPUK ANORGANIK TERHADAP PERTUMBUHAN DAN PRODUKSI TANAMAN CABAI MERAH (Capsicum Annum. L)." *GREEN SWARNADWIPA: JURNAL PENGEMBANGAN ILMU PERTANIAN* 1(1): 11–22.

Moyo, Jennifer Mbabazi, E H M Bah, and Audrey Verdier-Chouchane. 2015. "Transforming Africa's Agriculture to Improve Competitiveness." *The Africa competitiveness report* 2015: 37–52.

Muhammad, Nasruddin. "Respon Beberapa Varietas Jagung (Zea Mays, L) Akibat Pemberian Pupuk Organik Yang Berbeda Pada Tanah Subsoil." *Lentera: Jurnal Ilmiah Sains dan Teknologi* 15(16): 146946.

Novitasari, Adin. 2022. *Cekaman Air Dan Kehidupan Tanaman*. Universitas Brawijaya Press.

Nurhasan, Mulia et al. 2022. "Toward a Sustainable Food System in West Papua, Indonesia: Exploring the Links Between Dietary Transition, Food Security, and Forests." *Frontiers in Sustainable Food Systems* 5: 789186.

Nurisma, Viska. 2016. "Korelasi Dan Analisis Lintas Komponen-Komponen Hasil Kedelai (Glycine Max [L.] Merrill) Generasi F7 Hasil Persilangan Wilis X B3570."

Oktavianus, Gredo, Diana Sofia Hanafiah, and Eva Sartini Bayu. 2019. "Pengamatan Parameter Genetik Kedelai [Glycine Max (L.) Merril] Generasi M4 Pada Kondisi Optimum Dan Cekaman Kekeringan." *Jurnal Pertanian Tropik* 6(1): 123–28.

Purba, Rosmadelina, Tuty D S Matondang, and Wulan Minda Sari. 2019. "Pengaruh Pupuk Kalium Dan Kompos Tandan Kosong Kelapa Sawit Terhadap Pertumbuhan Dan Produksi Tanaman Jagung Manis (Zea Mays Saccharata Sturt): The Effect of Potassium Fertilizer and Oil Palm Plant Compos on the Growth and Production of Sweet Corn Plants (Zea Mays Saccharata Sturt)." *Rhizobia* 1(1): 16–31.

Rauf, A W, and A Fattah. 2021. "Effect of Harvest Time on Soybean Seed Quality of Detap-1 Variety." In *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 12027.

Ridwan, Ridwan, and Hanifa Hanifa. 2020. "Pengaruh Dosis Pupuk Kalium Terhadap Pertumbuhan Dan Hasil Tanaman Kedelai Pada Lahan Kering." *Agropet* 13(1): 43–53.

Saâ, Nyimas, Christian Raymond Siagian, and Maimun Barmawi. 2016. "Korelasi Dan Analisis Lintas Karakter Agronomi Kedelai (Glycine Max [L.] Merrill) Keturunan Persilangan Wilis X MLG 2521." *Jurnal Penelitian Pertanian Terapan* 16(1).

Sari, Geby Laguma Muliskah, Rindha Rentina Darah Pertami, and Eliyatiningsih Eliyatiningsih. 2022. "Aplikasi Pupuk Kalium Terhadap Pertumbuhan Dan Produksi Tanaman Cabai Merah Besar (Capsicum Annuum L.)." In *Agropross: National Conference Proceedings of Agriculture*, , 221–33.

Singh, Meenakshi et al. 2021. "Plant-Based Meat Analogue (PBMA) as a Sustainable Food: A Concise Review." *European Food Research and Technology* 247: 2499–2526.

Smercina, Darian N, Sarah E Evans, Maren L Friesen, and Lisa K Tiemann. 2019. "To Fix or Not to Fix: Controls on Free-Living Nitrogen Fixation in the Rhizosphere." *Applied and Environmental Microbiology* 85(6): e02546-18.

Steenbergen, Fabian. 2023. "Exploring the Global Soy Complex Using a Structural Supply-Demand Model and Price Cointegration Analysis."

Sumiati Putri, Tuti. 2017. "Studi Komparatif Kelayakan Usahatani Kedelai Berdasarkan Waktu Panen."

Suryadi, Muhammad et al. 2020. "PERTUMBUHAN DAN PRODUKSI BERBAGAI VARIETAS KEDELAI DI LAHAN SAWAH TADAH HUJAN SETELAH PADI." *AGrotekMAS Jurnal Indonesia: Jurnal Ilmu Peranian* 1(1): 67–74.

Taherzadeh, Oliver, and Dario Caro. 2019. "Drivers of Water and Land Use Embodied in International Soybean Trade." *Journal of Cleaner Production* 223: 83–93.

Waluyo, Tri. 2020. "Analisis Finansial Aplikasi Dosis Dan Jenis Pupuk Organik Cair Terhadap Produksi Tanaman Tomat (Lycopersicum Esculentum Mill)." *Ilmu dan Budaya* 41(70).

Wardhani, Yudhy, and Umi Kulsum Nur Qomariah. 2021. *Pemuliaan Tanaman*. LPPM Universitas KH. A. Wahab Hasbullah.

Xu, Xinxiang et al. 2023. "Appropriate Increasing Potassium Supply Alleviates the Inhibition of High Nitrogen on Root Growth by Regulating Antioxidant System, Hormone Balance, Carbon Assimilation and Transportation in Apple." *Scientia Horticulturae* 311: 111828.

Yofa, R D et al. 2021. "Strategies to Increase Soybean Production by Increasing the Distribution of New Superior Varieties." In *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, 12067.