Genetic progress on tandem selection of seed genotype several genotipe soybean

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Genetic progress on tandem selection of seed genotype several genotipe soybean

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ABSTRACT. The level of soybean consumption in Indonesia continues to increase with increasing population. However, soybean production in Indonesia is still not able to domestic needs. Increasing soybean production both in quantity and quality continues through plant breeding strategies., Selection is carried out to obtain plant character traits suitable for breeding purposes. The effectiveness and efficiency of selection is influenced by the amount progress of the selection. This study aims to determine the genetic progress of soybean by tandem selection. This research was conducted using thirteen treatments of the seventh generation of soybean plant genotypes with three replications. The selection method used was tandem selection. The data were obtained from observations of the agronomic characters of soybean plants selected from the tandem selection.. Data processing was analyzed using variance, then Scott-Knott test, and genetic progression. Based on the data that has been obtained, it can be seen that the results of tandem selection on crop yields of soybean plants are low genetic progress at flowering and harvesting age. Genetic progress is classified as moderate in crop yields. Genetic progress is high in plant height, number of productive branches, number of fertile nodes, weight of 100 seeds and number of pods.

I. Intoduction

Based on the background of the problems in the research, the problem formulations can be formulated as follows: How much genetic progress has occurred in some soybean genotypes using tandem selection?

Aim

Based on the background of the problems in the research, the objectives of this research are: This is to determine the genetic progress that occurs in several genotypes of soybean plants.

Benefits

Can find out the genetic progress that occurs in some soybean plant genotypes. Can be information on plant breeding with tandem selection

2. MATERIAL AND RESEARCH METHODS

Time and Place of Research

This research was conducted in the Jember polytechnic experimental garden located in Tegal Gede Village, Sumber Sari, Jember. RBD Design used in this research.This research was conducted in May 2019 until it was completed.

Experimental Tools and Materials

The tools used in this experiment include: sprayer, bucket, gembor, scissors, roll meters, scales, stationery and cameras. Meanwhile, the materials used in this experiment used 13 genotypes of soybeans, pesticides, and fertilizers N, P, and K.

Experimental design

The method used in this experiment was a randomized block design (RBD) with one treatment factor, namely 14 seventh gene-ration soybean plant genotypes with 3 replications. The data obtained were analyzed by means of analysis of variance, followed by a Scott-Knot test, and genetic progress.

Observation Variables

Observations were made during the plant growth phase until the plants were harvested, the observation parameters used were as follows: Plant height (cm), number of primary branches, number of fertile books, age of flowering, number of pods planted, harvest age, weight of seeds planted, Weight 100 seeds (g).

3. RESULTS AND DISCUSSION

Results and Discussion

The results of the observation of the observation variables were carried out by analysis of variance, estimating the value of heretability and genetic progress. Following are the results of the recapitulation of F_7 soybean plant variability analysis can be seen in Table 4.1 below

Table 4.1 Recapitulation of Analisis of Variance

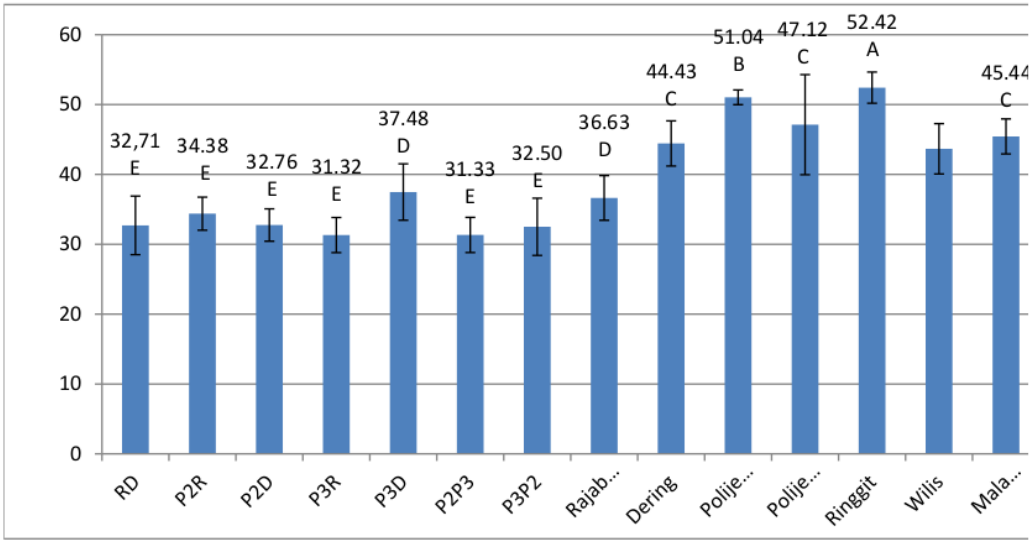
Charracters	F Calculations
Plant Height	14,104 **
Number of Branch	6,819 **
Number of Seed Nodes	22,368 **
Flowering Age	9,700 **
Harvest Age	8,008 **
Seed Yield per Plant	5,013 **
100 Seed Weight	8,059 **
Number of Pods	11,258 **

** = significantdifference N = non significant
F table : 5% : 2.119 1%: 2.904

Table 4.1 shows that the treatment of the 14 genotypes tested had a very significant effect (**) on the observation parameters of flowering age, harvesting age, plant height at harvest, number of productive branches, number of fertile books, number of pods, crop yield, and weight of 100 items.

Plant height

The height of the plant was observed when the plants had been harvested. The results of the variety of observations of plant height were then carried out further tests with the nott scot test in Graph 4.1 below.



D = Dering, R = Rajabasa, P2 = Polije 2, P3 = Polije 3

Figure 4.1. Average Plant Height

Based on Figure 4.1, the average height of the plants in the genotype resulted from the highest crossing was the P3D genotype with an average of 37.48. According to Adie and Krisnawati (2007) in Butar and Lubis (1), the difference in plant growth in the vegetative phase of soybean plants is deterministic and indeterminite. The determinant type, namely the vegetative phase of the plant, will stop when it enters the generative phase, namely flowering. While the indeterminit type of plant vegetative growth does not stop when it enters the flowering phase.

Number of Branches

The results of the variety of observations of plant height were then carried out further tests with the Scott-Knott test in Graph 4.2 below.

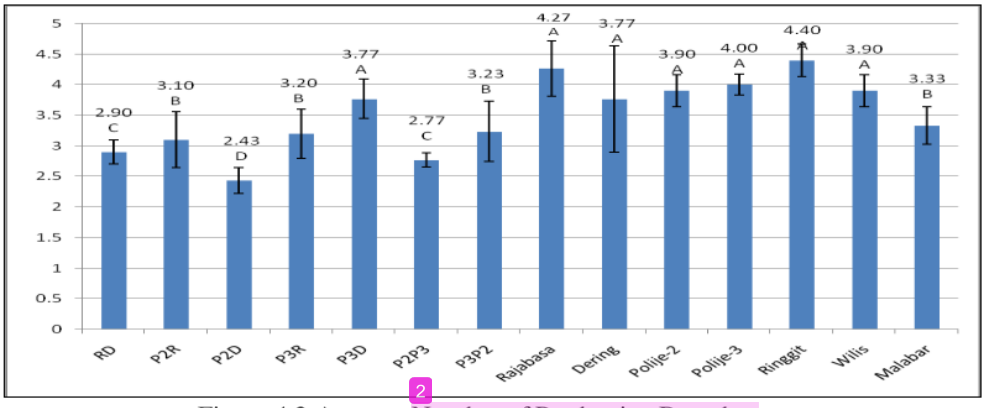
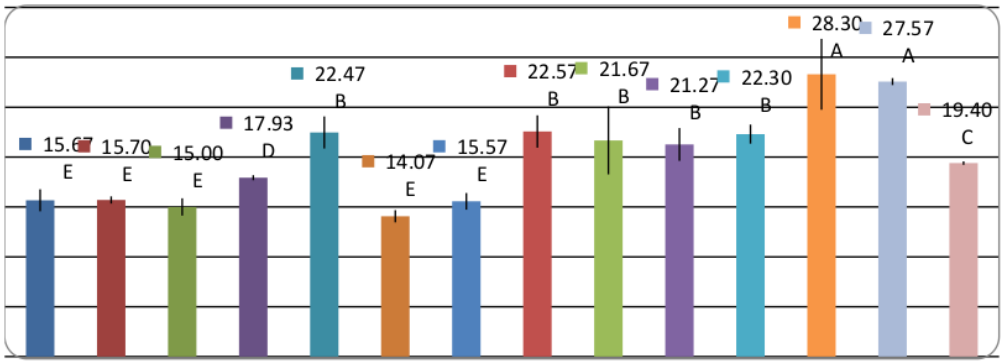


Figure 4.2 Average Number of Productive Branches

Based on Figure 4.2, the average number of productive branches planted in the high genotype was in the P3D genotype with an average of 3.77. Factors that influence the g environmental influenced branching. Genetically, plants can influence the potential for branchi and produce hormones to control the branching that will be formed (Handara *et al*. 2). Envir influenced by light intensity. The higher the light intensity received by the food plant, the mo that are formed (Butar and Lubis. 1).

Number of Fertile books

The results of the variety of observations of plant height were then carried out further tests with the Scott-Knott test in Graph 4.3 below



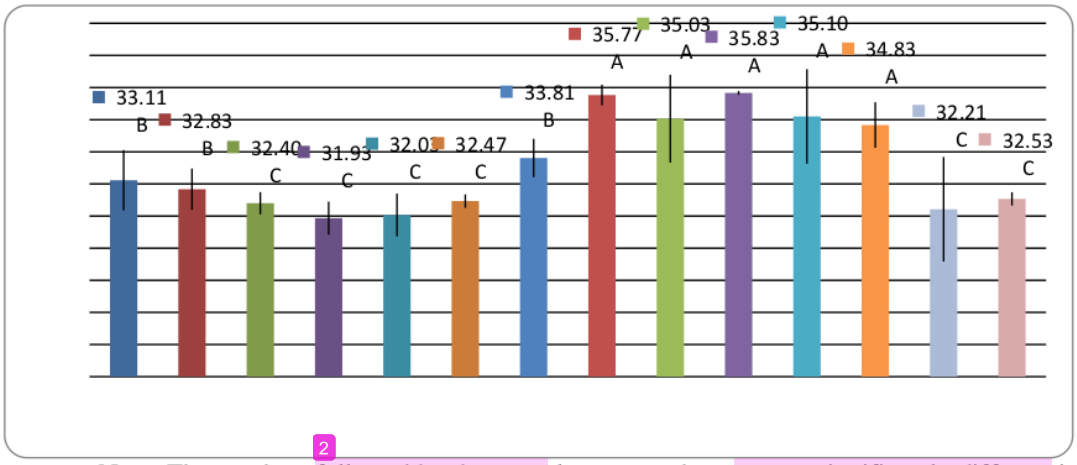
Note: The numbers followed by the same lowercase show are not significantly differen the Scott-Knott test . D = Deing, R = Rajabasa, P2 = Polije 2

Figure 4.3 Average Number of Fertile Books

Based on Figure 4.3, the genotype resul N, P3 = Polije ts with the highest average number of fertile books were on the P3D genotype with an average of 22.47. Fertile books tend to form more in plants with a higher plant height and have more branches (Syaputra *et al*. 3). This is evident from the results of the study, it is known that the genotypes resulting from P3D crosses have the highest plant height, number of branches and number of fertile books.

Flowering Age

The results of the variance of flowering age were carried out by the 5% Scott-Knott test in Graph 4.4 below.

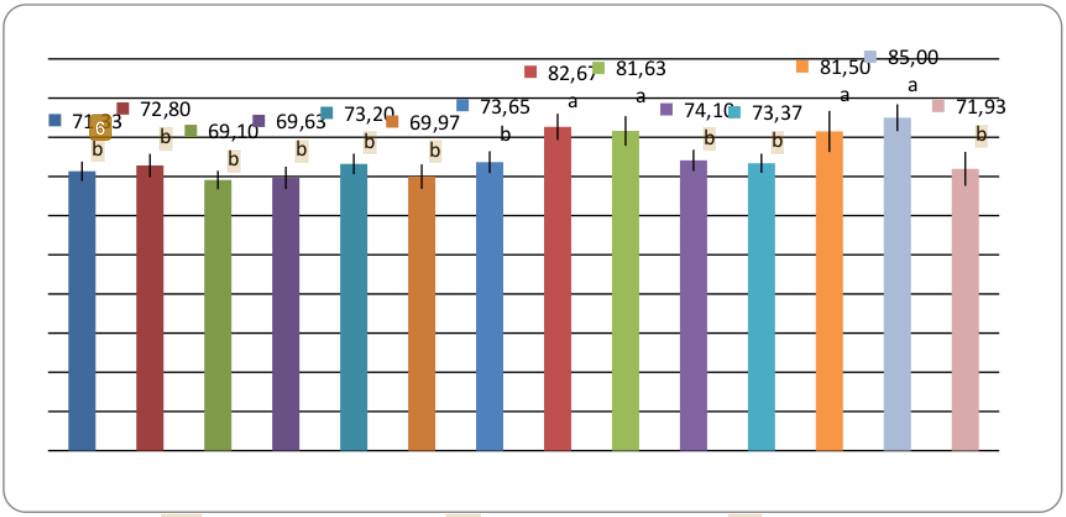


Note: The numbers followed by the same lowercase show are not significantly different in the nott scot test. D = Dering, R = Rajabasa, P2 = Polije 2, P3 = Polije 3

Figure 4.4 Average Flowering Age

Based on Figure 4.4, genotypes with flowering ages were observed on P3R with an average flowering age of 31.93. According to Suprapto (4), plant growth can vary due to the genetic traits carried and the genetic response to the surrounding environment. According to Syaputra *et al*. (3), flowering age is often stated as a result of the interaction between the properties inherited from the properties of the parents and the environmental conditions in which the cultivar is cultivated, in this case the duration of exposure (days) and temperature.

Harvest Age



Note: The numbers followed by the same lowercase show are not significantly different in the nott scot test. D = Dering, R = Rajabasa, P2 = Polije 2, P3 = Polije 3

Figure 4.5 Average Harvest

The results of the variance of harvest age were carried out by the 5% Skott-Knott test in Graph 4.5 below.

Based on Figure 4.5, the genotype results with an average age of the fastest genotype P2D with an average of 69.10 DAS. It is suspected that environmental factors are more influencing in the process of fruit formation and filling of pods so that they affect the longer harvesting life. will be different.

Planting Results

The results of the variety of cropping results were carried out by the 5% skott-nott test in Graph 4.6 below

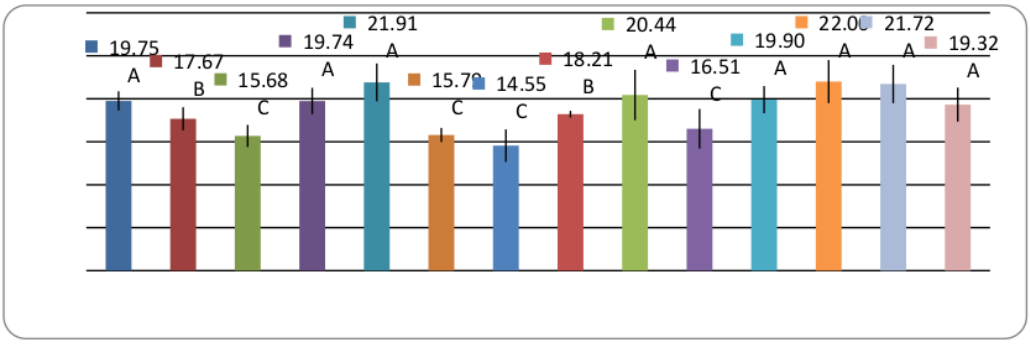


Figure 4.6 Average Crop Yield (Gram)

Based on Figure 4.6, the genotype results with the highest average number of pods were in the P3D genotype with an average of 21.91. According to Hayati *et al* (5) states that the high production of a variety is due to the variety being able to adapt to the environment. So even though the plant's genetic makeup is good, if it is not able to adapt to the environment where it is grown, then the crop production is less than optimal, thus plant production will be relatively low.

Weight 100 Seeds

The results of the variance of cropping results were carried out by the 5% Scott-nott test in Graph 4.7 be

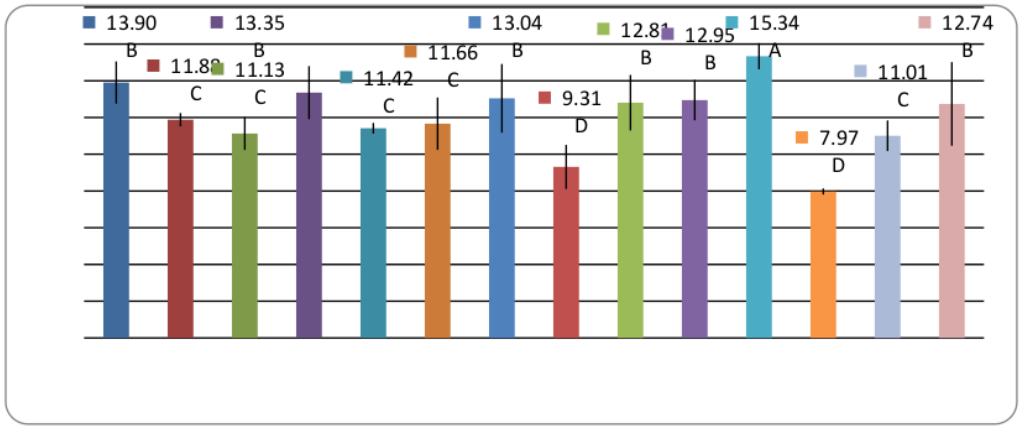


Figure 4.7 Average Weight of 100 Seeds

Note: The numbers followed by the same lowercase show are not significantly different in the nott scot test. D = Dering, R = Rajabasa, P_2 = Polije 2, P_3 = Polije 3

Based on Figure 4.7, the genotype results with the highest average number of pods were in the RD genotype with an average of 13.90. According to Sjamsijah *et al* (6) that the maximum number and size of seeds is determined by genetic factors inherited by the parents, as well as environmental conditions during seed filling. Good planting land conditions such as adequate water needs and sufficient soil nutrients will maximize the plant in the formation of seed filling so that the size of the seeds will be bigger and the weight of the seeds will increase.

Number of Pods

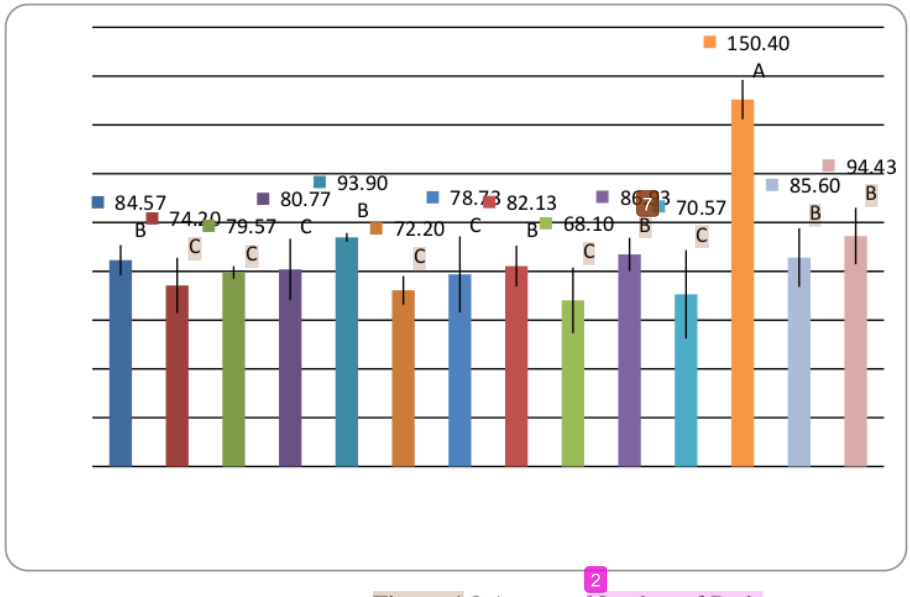


Figure 4.8 Average Number of Pods

The results of the variance of cropping were carried out by the 5% Scott-Knott test in Graph 4.8 below

Based on Figure 4.The genotype results with the highest average number of pods were in the P3D genotype with an average of 93.90. According to Jamroni in Agustin, (7) states that the number of pods is a quantitative trait whose reduction is inherited simply, but the number of pods formed is determined by environmental factors during seed filling. The number of flowers that successfully become pods is influenced by environmental conditions such as sunlight, temperature, nutrient adequacy, and water availability.

Genetic Advancement

The results of the observations of some of the above characters were carried out by estimating the value of heritability and the selection response, which was then carried out by calculating the genetic progress of each character. The following is a summary of the estimated value of the selection response for each character, in Table 4.9.

Table 4.9 Estimad Respon to Selection to Quantitative Characters With 20 % Selection Intensity

Characters	h^2 (%)	R	KG (%)
Flower Age	74	1,65	4,94
Harvest Age	70	5,85	7,80
Plant Height	81	9,23	23,36
Productive Branch	66	0,67	17,66
Filled Nodes	88	5,84	29,26
Number of Seed Pods	77	23,75	27,67
Seed Yield per Plant	57	2,32	12,36
100 Seed Weight	70	2,05	17

I = Selection intensity 20% (1,4)
h^2 = *Heritability*
R = *Respon to Selection*
KG = *Genetic Advance*

Table 4.9 Estimated Selection Response to the Quantitative Character of the F7 Genotype with a Selection Intensity of 20% in Observation Parameters

Based on Table 4.2, the genetic progress of the crop yield character is 12.36%, this genetic progress is classified as moderate. According to Helianto (1998) in Zen (8), the category of genetic progress values is low, namely 0.00- 7.00%, moderate 7.10%-14.00% and high category if > 14.01%.

Genetic progress on the character of the crop is classified as moderate. This shows an increase in genetic progress from the previous generation. tandem selection can be carried out again in the next generation because it is suspected that these characters can be carried over to the next generation. Where this genetic progress describes the success of the selection method used. According to Satoto and Supryono in Kustera (9), the high value of genetic progress in a character indicates that the character's appearance is supported by genetic factors so that it can complement the progress of selection. Genetic progress can be used as a guide in determining selection activities. The greater the value of the expected genetic progress of a character, the greater the chance for improvement of the character through subsequent selection (Waryana 2010).

CONCLUSION

1. Conclusion

Based on the results of observations, analysis and discussion of research on the response to the character selection of F_7 crops (seed weight) on several soybean plant genotypes, it can be concluded that: By using tandem selection, the results of genetic progress were classified as low in the flowering age parameter of 4.94%, and the parameter of harvesting age was 7.80%, and genetic progress was classified as moderate in the character of the cropping yield of 12.36%, and genetic progress was classified as high. on plant height parameters 23.36, the number of productive branches 17.66%, the number of fertile books 29.26%, 100 grain weight 17.00%, and the number of pods planted 27.67%.

2. **Suggestion**

Adaptation tests and multilocation tests (F8) need to be carried out to determine the superiority of the early age and high production characters of each genotype so that these lines are eligible to be registered as new superior varieties.

Acknoledgment

I would like to thank the Agricultural Service of the Republic of Indonesia for the costs that have been provided through the KKP3N program.

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