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CROSS- AND SELF-POLLINATION TO EVALUATE THE YIELD CHARACTERISTICS IN F3 MELON (*CUCUMIS MELO* L.) INBRED LINES

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Abstract: This study aims to determine the percentage of pollination of a combination of cross-pollination and self-pollination in several melon inbred lines and to determine the yield character of the combination of cross-pollination and self-pollination in F3 melon inbred lines. The study was conducted in 2021 and 2022 by using nine melon inbred lines as planting material, consisting of 4 female parents (ACL211390, ACL221402, ACL221326, and ACL231312) and 5 male parents (ACD211303, ACD211254, ACD221362, ACD231380, and ACL21402). In general, the percentage of successful pollination showed various values, and the value of 100% was not obtained from all sample plants. This was because the pollination of 3 hermaphrodite flowers (female parents) on each sample plant was carried out at different times. The results of the observations of yield characteristics (fruit weight, fruit diameter, fruit length, flesh thickness, and fruit total soluble solids) showed different values between the pollination combinations in the same female parent inbred. The differences in pollen sources were responsible for the differences in yield characteristics between the pollinated combinations with the same female parent. The Student's t-test between the inbreds ACL211390, ACL221402, ACL221326, and ACL231312 (female parent) showed that there was no significant difference in the mean percentage of pollination success and that there were significant to very significant differences in several yield characters. The difference in yield characters was due to differences in the composition of genetic material between the inbreds ACL211390, ACL221402, ACL221326, and ACL231312.

Key words: cross-pollination, inbred, melon, self-pollination, pollination.

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Introduction

The melon (*Cucumis melo* L.) is one of the horticultural plants from the Cucurbitaceae family and is favored for its fruit because it has a sweet, fresh taste, and is rich in nutrients. In addition, the melon is a healthy fruit that contains lots of vitamins, proteins, and carbohydrates. The origin of the melon plant is not known for sure. However, the wild species of Cucumis suggest that melon plants came from the African continent. However, recent research suggests that melons originate from Asia (Shashikumar and Pitchaimuthu, 2016). The melon is a plant with high economic value and therefore has the potential to be developed. However, melon production has decreased from year to year. The demand for good quality melons will increase as people's lifestyles change and they begin to pay attention to what they eat. The increased production value of melons affects the availability of seeds as planting material. The demand for the continuous availability of seeds causes an increase in seed production activities. This is followed by an increase in superior melon seeds. However, the availability of domestic melon seed production and quality seed varieties is not sufficient to meet the needs.

The superior seeds need to be developed, aiming to obtain unique melons that meet market needs and can adapt to various environmental conditions. There are several methods to produce superior melon seeds in plant breeding, one of which is pollination. Pollination is the process of transferring pollen from the anther to the receptive stigma (Ren et al., 2018). The failure of artificial pollination and melon fruit formation is still quite high. This is because the formation of melon fruits and seeds depends on the stigma receptive period of the pollen viability. The amount of pollen used in the artificial pollination process can also greatly affect the success of pollination. The availability of pollen in one male flower with good viability is expected to pollinate more than one female flower under optimum conditions (Pattemore, 2017).

Another factor that affects pollination success in melons is the genetic compatibility of the pollen used during self-pollination and cross-pollination (Duarte et al., 2017). In addition, environmental factors such as temperature and humidity also greatly affect pollination success. Studies have shown that high temperatures can reduce pollen viability, while optimal humidity levels can enhance pollen germination and tube growth (Koch et al., 2017). Thus, the selection of compatible hybrids with superior characters is very important in increasing pollination yield. Ideal environmental controls such as temperature and humidity settings as well as the timing of pollination in a controlled environment are important factors to consider. Research shows that the optimal time for pollination is in the morning when the flowers are most receptive to pollen (Henrique et al., 2015). In a controlled environment, breeders can also synchronize

the flowering periods of different melon varieties to facilitate cross-pollination. This synchronization is critical to ensure that compatible pollen is available when flowers are receptive, thus maximizing the chances of successful fertilization (Suhri et al., 2022).

One of the initial considerations in selecting hybrid parents can be through cross-pollination between inbreds currently in the purification stage, such as F3, F4, etc. This is to predict the success of cross-pollination and to predict inbred candidates that have the potential to be hybrid parents by observing differences in the character of the fruit from cross-pollination. The study results are expected to provide information on the success rate of cross-pollination and yield characteristics in each cross-pollination combination so that it can be considered in the selection of inbred candidates for the development of superior hybrid melon seeds (Handayani et al., 2022).

Material and Methods

The research was conducted at the Brawijaya University Greenhouse located in Donowarih Village, Karangploso District, Malang Regency, East Java Province. The Donowarih Village is located at an altitude of 720 masl with an average annual rainfall of 250 mm/month and an average temperature of 27°C. The research was carried out in 2021 and 2022 when the rain intensity was low.

The genetic material used comprised nine inbred lines of melon (F3), consisting of 4 as female parents and 5 as male parents. The following 9 melon inbred parents are ACD211303 (A), ACD211254 (B), ACD221362 (C), ACD231380 (D), ACL211390 (F), ACL211402 (G), ACL221402 (H), ACL221451 (I) and ACL231312 (J). The research was carried out by self-pollinating 4 melon inbreds and cross-pollinating them with 5 different inbreds (male parents). The number of plants used in the study was 48 plants with 2 plants in each combination. Each female parent plant was pollinated with 3 hermaphrodite flowers that had previously been emasculated. The pollination was not carried out simultaneously (day), but when the hermaphrodite flowers were ready for pollination. The total number of hermaphrodite flowers pollinated in this study was 144. The seedlings were planted 14 days before transplanting. Fertilization was carried out once a week in the form of a solution with different doses of fertilizer given. When fertilizing the plants at the age of 10 DAP, the fertilizer KNO3 Merah was administered at a dose of 7.95 g per 8 liters of water. Plants aged 20–35 DAP received fertilizer in the form of NPK compound fertilizer at a dose of 11.3 g per 8 liters of water. Plants aged 40–50 DAP received Multi KP fertilizer at a dose of 9.09 g per 8 liters of water. Melon plant-insect pest control was carried out using insecticide Curacorn 500 EC and Decis 25 EC. Melon plant disease control was conducted using fungicides Antracol 70 WP, Dithane M-45 80 WP, and Agri-mycin 17.

The observational data were presented in tables and then analyzed. Data analysis was performed using an unpaired Student's t-test at the 5% level using the SPSS software. The unpaired Student t-test analysis was used to compare the mean percentage of pollination success and the yield characteristics between self-pollination and cross-pollination. The following are the test criteria and the formula for analyzing variance of the unpaired t-test:

-Taccount < Ttable or Taccount > Ttable = then there is a difference between the groups,

-Ttable Tcount Ttable = there is no difference between the groups,

if the variance is homogeneous, then: if the variance is not homogeneous, then:

$$T_{count} = \frac{x1-x2}{\sqrt{s2p\ (\frac{1}{n1}+\frac{1}{n2})}} \qquad T_{count} = \frac{x1-x2}{\sqrt{\frac{S12}{n1}+\frac{S22}{n2}}}$$

information: 1 = the average of the 1st sample, 2 = the average of the 2nd sample, sp 2 = the variance of the sample, n1 = the number of the 1st sample, n2 = the number of the 2nd sample, s2 1 = the variance of the sample to -1, s2 2 = the variance of the 2nd sample (Source: Ireland, 2010).

Before the t-test, normality and homogeneity tests were conducted to determine whether the data met the requirements for the t-test. The homogeneity of variance test was carried out using the Levene's test. The following are the criteria and formulas for the homogeneity of the variance test from the Levene's test.

F_{count} F_{table} atau Sig. ≤ α = the variance of all groups is not homogeneous,

$F_{count} < F_{table}$ atau Sig. > α = the variance of all homogeneous groups,

$$F_{count} = \frac{(N\text{-}K)\sum_{i=1}^{k} n_i\ (\bar{d}_i\ \text{-}\bar{d}_{ii})^2}{(k\text{-}1)\sum_{i=1}^{k}\ (\bar{d}_i\ \text{-}\bar{d}_{ii})^2}$$

information: N = the total number of samples, ni = the number of samples to-I, K = the number of sample groups, di = the value of the sample difference to the group mean, dii = the value of the difference between the groups to the mean differentiated between the groups (Aminoto and Agustina, 2020).

The normality test was carried out using the Shapiro-Wilk test. According to Ahsanullah et al. (2014), the hypotheses and the Shapiro-Wilk test formula are as follows:

a. Shapiro-Wilk test hypothesis for normality,

H0: the data is normally distributed,

H1: the data is not normally distributed,

(H0 is accepted if W > W table or Sig. > α).

b. Statistical formula of the Shapiro-Wilk test

$$W = \frac{\sum_{i=1}^{k} a_i \, (y_{n-i+1} - y_i)^2}{\sum_{i=1}^{n} \quad (x_i - \bar{x})^2}$$

information: W = Shapiro-Wilk test statistic, k = n/2, i = coefficient, yi = observational data in the first sample, y n-i+1 = observational data in the (n- i+1), n = the number of samples, xi = the value of the sample, x = the sample mean.

Results and Discussion

Crosses between several melon inbreds

The percentage of successful pollination of several inbreds tested on each sample plant and the average per pollination combination are presented in Table 1. The results of 4 inbreds (ACL211390, ACL221402, ACL221326, and ACL231312) with one pollination treatment on 3 hermaphrodite flowers per plant show a high mean of pollination success. The results of the calculations for the inbred ACL211390 and ACL221326 showed that the self-pollination treatment had a higher average pollination success (67%) than the cross-pollination treatment. Furthermore, the ACL221402 inbred showed that the cross-pollination treatment with the ACD211303 inbred had a higher mean of pollination success (67%) than the other treatments, followed by the ACL221326 inbred crossed with ACD211303. In addition, the ACL231312 inbred also showed that the cross-pollination treatment with the ACL211402 inbred had a higher pollination success rate (67%) than the other treatments. The percentage of successful pollination was obtained by comparing the successful pollination with the total pollination carried out on each plant sample. Table 1 shows the percentage of successful pollination in each plant sample and the average per treatment. Based on these observations, a t-test analysis was performed to determine if there was a difference in the percentage of successful pollination between the inbreds of ACL211390, ACL221402, ACL221326, and ACL231312 (Table 2). The results of the t-test analysis between the inbreds ACL211390, ACL221402, ACL221326, and ACL231312 show that the percentage of pollination success was not significantly different. The insignificant difference is because both pollination methods can produce good melon fruit, but the difference lies in the resulting impact, namely self-pollination can increase genetic depression and cross-pollination can increase genetic diversity. In addition, the results of cross-pollination are of higher quality than the results of self-pollination (Taber and Olmstead, 2016; Kämper et al., 2021). The success of pollination in this case is not therefore influenced by self-pollination and cross-

pollination techniques, but by other factors such as the maturity of the pollen or pistil at the time of pollination.

Table 1. Cross percentage.

Treatment	Cross percentage (%)		Average (%)
	Sample 1	Sample 2	
Self-pollination			
ACL211390 X ACL211390	67	67	67
ACL221402 X ACL221402	33	33	33
ACL221326 X ACL221326	67	67	67
ACL231312 X ACL231312	33	33	33
Cross-pollination			
ACL211390 X ACD211303	67	33	50
ACL211390 X ACD211254	33	33	33
ACL211390 X ACD221362	33	67	50
ACL211390 X ACD231380	33	33	33
ACL211390 X ACL211402	33	33	33
ACL221402 X ACD211303	67	67	67
ACL221402 X ACD211254	33	67	50
ACL221402 X ACD221362	33	33	33
ACL221402 X ACD231380	67	33	50
ACL221402 X ACL211402	33	33	33
ACL221326 X ACD211303	67	33	50
ACL221326 X ACD211254	67	67	67
ACL221326 X ACD221362	67	33	50
ACL221326 X ACD231380	33	67	50
ACL221326 X ACL211402	33	33	33
ACL231312 X ACD211303	33	67	50
ACL231312 X ACD211254	33	33	33
ACL231312 X ACD221362	33	67	50
ACL231312 X ACD231380	33	33	33
ACL231312 X ACL211402	67	67	67
Average (%)			46

Table 2. Results of the t-test percentage of inbred pollination.

Inbred	T-count
ACL211390 and ACL 221402	-0.94 ns
ACL211390 and ACL221326	0.24 ns
ACL211390 and ACL 231321	0.00 ns
ACL221402 and ACL221326	-0.42 ns
ACL221402 and ACL231312	-0.94 ns
ACL221326 and ACL231312	0.42 ns

Information: (*) *t*-value significant at 0.05, (**) *t*-value significant at 0.01 and (ns) *t*-value not significant.

Pollination is considered successful if the ovules of the pollinated hermaphrodite flowers (female elders) remain green and develop into fruit. Meanwhile, the pollination is considered to have failed when the ovules wilt and turn yellow and then fall off. Overall, the 4 inbreds show that of the 3 hermaphrodite flowers (female parents) per pollinated plant, the average percentage of pollination success was different or varied and there was no result where the percentage of pollination success was equal to 100% for all sample plants. Pattemore (2017) stated that the success of pollination can be influenced by the receptivity of the stigma when receiving pollen. Furthermore, Hasanuddin (2013) has stated that maximum stigma receptivity occurs when the flowers bloom and the day after blooming, while maximum pollen viability is reached one day after blooming. At the time of the study, the melon plant flowers bloomed in the morning. Synchronization between the time of flowering of the female and male flowers is also one of the factors that determine the success of fertilization in crosses. This is related to the readiness of the pistil for pollen tube growth. According to Vidal et al. (2010), the success of hybridization also depends on the efficiency of the pollinator during the receptive female flower period and the viability of the pollen used. The implication of successful pollination is key in the early stages of variety assembly for both self-pollinated and cross-pollinated crops. In the case of this melon study, the pollination method did not differ significantly between self-pollination and cross-pollination. However, the method had an impact on fruit yield and quality, as cross-pollinated fruits were always heavier than self-pollinated fruits of the same cultivar, which is highly correlated with the number of seeds per fruit (Taber and Olmstead, 2016). Similar studies have also shown that fruits produced by cross-pollination tend to be larger and sweeter than those produced through self-pollination (Suhri et al*.,* 2022). The findings of this study can therefore contribute to the development of melons. Paying attention to the success factors of pollination is the key to obtaining optimal results from the results of self-pollination and cross-pollination.

Yield characteristics of several melon inbred crosses

The observed yield characteristics included fruit weight, fruit length, fruit diameter, fruit flesh thickness, and fruit total soluble solids. The pollinated characters of the inbreds of ACL211390, ACL221402, ACL221326, and ACL231312 are shown in Table 3. The pollination results for the inbred ACL211390 show that the highest mean fruit weight (964.50 g), fruit diameter (12.53 cm), fruit length (10.92 cm), and fruit flesh thickness (2.85 cm) were found in the ACL211390 X ACL21402 cross-pollination treatment. The highest average fruit sweetness (13°Brix) was found in the ACL211390 X ACD221362 treatment. Two treatments with cross-pollination (ACL211390 X ACD211254 and

ACL211390 X ACL21402) had higher fruit weight than those with self-pollination (629.0 g). Cross-pollination has been shown to improve fruit quality, with fruits that are often larger, sweeter, and more uniform in size compared to those produced through self-pollination (Pérez-Marcos et al., 2023). The quantity of yield associated with cross-pollination is generally higher than with self-pollination. Studies show that cross-pollinated melons can achieve significantly greater yields due to better fruit formation and quality (Atmowidi et al., 2022). These yield differences can be the basis for the development of higher-yielding and sweeter melons through cross-pollination methods. However, crossing techniques such as pollen distribution and plant microclimate also need to be considered for optimal cross-pollination results. Similar studies have shown that even pollen distribution across the pistil is important for fruit development and increased yield and fruit quality (Wietzke et al., 2018). According to Tatari et al. (2018), fruit formation is also influenced by temperature, humidity, and insect activity.

The results of pollination on the inbred ACL221402 show that the highest average fruit weight (749.50 g), fruit diameter (11.02 cm), fruit length (10.88 cm), and fruit flesh thickness (2.48 cm) were found in the self-pollinated treatment. The highest average fruit total soluble solids (14.10°Brix) were found in treatments ACL221402 X ACD211254 and ACL221402 X ACD231380. Overall, the inbred of ACL221402 in the cross-pollination treatment had a lower fruit weight than in the self-pollination treatment (749.50 g). Three cross-pollinated treatments (ACL221402 X ACD211303, ACL221402 X ACD221362 and ACL221402 X ACD231380) had a higher average fruit sweetness than the self-pollinated treatment (12.70°Brix). The sweetness or increased sugar content in melons and the fruit weight are the most important indicators of melon quantity and quality. Self-pollination results that show lower weights, while some studies such as Pérez-Marcos et al. (2023) and Suhri et al. (2022) showed higher weights, can be caused by pollen distribution, which is related to the technical conditions of field cross-pollination and nutrient availability. Similar studies have shown that the increase in size, weight, sweetness, and number of seeds is due to the even distribution of pollen on the pistil (Huang et al., 2017). In addition, higher pollen counts can result in better seed set and heavier fruit, emphasizing the importance of selecting compatible pollen sources (Kendall et al., 2020). Thus, the selection of parents with superior and competent traits is the main basis for increasing the yield of cross-pollination in melons. Similar studies have also shown that cross-pollinated seeds often produce more auxin, a growth-promoting plant hormone, compared to self-pollinated seeds (Dung et al., 2022). This hormonal advantage can result in faster fruit development and larger fruits.

The ACL221326 inbred showed the highest mean fruit weight (804.0 g), the largest fruit diameter (12.00 cm), and the greatest pulp thickness (2.81 cm) found in the self-pollinated treatment. Meanwhile, the highest mean fruit length (10.85

cm) was found in the cross-pollination ACL221402 X ACD211254 treatment and fruit total soluble solids (13.00 °Brix) were found in the ACL211390 X ACD221362 treatment. Overall, the inbred of ACL221326 in the cross-pollination treatment had lower fruit weight, fruit diameter, and flesh thickness than in the self-pollinated treatment. According to Shafique et al. (2011), different pollen sources have different pollen viability, germination percentage, and genetic composition, which can affect the process of fruit formation.

Table 3. The mean of the inbred characters of ACL211390, ACL221402, ACL221326, and ACL231312 self-pollinated and cross-pollinated.

Treatment	FW (g)	FD (cm)	FL (cm)	FFT (cm)	FTSS (°Brix)
Self-pollination					
ACL211390 X ACL211390	629.0	10.97	9.96	2.38	9.30
ACL221402 X ACL221402	749.5	11.02	10.88	2.48	12.70
ACL221326 X ACL221326	804.0	12.00	10.15	2.81	10.90
ACL231312 X ACL231312	507.5	10.50	8.75	2.17	10.73
Cross-pollination					
ACL211390 X ACD211303	571.5	10.89	8.70	2.10	11.00
ACL211390 X ACD211254	866.0	12.15	10.43	2.83	10.20
ACL211390 X ACD221362	640.5	10.73	10.17	2.38	13.00
ACL211390 X ACD231380	353.5	8.97	8.41	1.70	9.40
ACL211390 X ACL211402	964.5	12.53	10.92	2.85	10.10
ACL221402 X ACD211303	393.0	9.08	8.53	1.53	13.20
ACL221402 X ACD211254	616.0	10.25	10.85	1.85	11.90
ACL221402 X ACD221362	418.5	9.24	9.48	1.82	13.60
ACL221402 X ACD231380	579.5	10.60	9.18	2.07	14.10
ACL221402 X ACL211402	528.5	9.90	9.27	2.25	12.10
ACL221326 X ACD211303	823.5	11.87	9.95	2.46	10.1
ACL221326 X ACD211254	697.5	10.50	9.18	2.35	9.8
ACL221326 X ACD221362	665.5	11.41	8.8	2.53	10.66
ACL221326 X ACD231380	834.5	12.39	9.85	2.83	11.20
ACL221326 X ACL211402	829.0	11.60	10.15	2.55	11.20
ACL231312 X ACD211303	687.0	11.35	10.24	2.34	13.10
ACL231312 X ACD211254	658.5	10.93	10.37	2.27	12.80
ACL231312 X ACD221362	721.5	11.53	9.90	2.25	8.70
ACL231312 X ACD231380	422.0	9.22	9.72	1.93	10.40
ACL231312 X ACL211402	692.5	11.36	10.64	2.18	12.55

Information: (FW) fruit weight, (FD) fruit diameter, (FL) fruit length, (FFT) fruit flesh thickness, (FTSS) fruit total soluble solids.

Overall, except for ACL231312 X ACL21402, the inbred of ACL231312 in the cross-pollination treatment had higher fruit weight than in the self-pollination treatment (507.5 g) and there were three cross-pollination treatments (ACL231312

X ACD211303, ACL231312 X ACD211254, and ACL231312 X ACL21402) which had higher fruit total soluble solids than self-pollination treatment (10.73°Brix). The inbred of ACL231312 showed cross-pollination results with the inbred of ACD221362 having the higher average fruit weight (721.50 g) and fruit diameter (11.53 cm) than the other treatments. Then, the highest average fruit length (10.64 cm) was found in the ACL231312 X ACL211402 treatment. The highest mean thickness of fruit flesh (2.34 cm) and the highest fruit total soluble solids (13.1°Brix) were found in the cross-pollination treatment ACL231312 X ACD211303. The yield potential of melons is not only influenced by the pollination technique, but also by the pollen source. Thus, the compatibility of the pollen source with the target cultivar must be assessed. Pollen from closely related cultivars is more likely to result in successful fertilization and higher fruit quality. Similar studies have shown that higher pollen counts can result in better seed set and heavier fruit, emphasizing the importance of selecting compatible pollen sources (Kendall et al., 2020). Similar studies have shown that different pollen sources can lead to variations in fruit weight and diameter. Certain pollen donors have been associated with increased fruit weight, as well as larger fruit dimensions (Deng et al., 2022). These relationships highlight the importance of selecting the right pollen donor to optimize these traits in melons. Yield characters are highly related and positively correlated, although fruit weight and sweetness are the main indicators. Similar research showed that traits such as fruit length, diameter, and flesh thickness were significantly correlated with fruit weight, indicating that these morphological traits are important for assessing genetic variability and yield potential in breeding programs (Ivanova and Velkov, 2021).

Table 4 shows that the fruit weight of the inbred ACL211390 was not significantly different from the inbreds of ACL221402 and ACL231312, ACL221402 and ACL231312 and ACL221326 and ACL231312. However, there were significant differences between the inbreds of ACL221402 and ACL231312 as well as ACL221402 and ACL221326. As for the diameter of the fruit, the thickness of the flesh, and the fruit total soluble solids, the inbred ACL221402 was found to be significantly different from the inbred of ACL211390, ACL231312, and ACL221326 and not significantly different from the inbred of ACL211390 and ACL231312, ACL211390 and ACL221326, ACL221402 and ACL231312 and ACL23131226 and ACL23131226. Furthermore, the fruit length shown in the 4 inbreds analyzed was not significantly different. The t-test results between the inbreds ACL211390, ACL221402, ACL221326, and ACL231312 showed significant to very significant differences in the yield characteristics of fruit weight, fruit diameter, flesh thickness, number of seeds, and fruit total soluble solids. The difference in the character of these results could be caused by differences in the composition of the genetic material between the inbreds ACL211390, ACL221402, ACL221326, and ACL231312. This is in accordance with the study of Huda et al.

(2017), which states that genotype has a significant effect on male flower age, harvest age, fruit length, fruit diameter, fruit flesh thickness, fruit skin thickness, fruit weight, and fruit total soluble solids.

Table 4. Results of the t-test character percentage.

Inbred	FW (g)	FD (cm)	FL (cm)	FFT (cm)	FTSS (^{o}Brix)
ACL211390 and ACL 221402	2.07ns	2.53*	0.57ns	2.63*	-3.97**
ACL211390 and ACL221326	-1.46ns	-1.31ns	0.24ns	0.73ns	0.41ns
ACL211390 and ACL 231321	-2.24*	-2.64*	-2.00ns	-1.98ns	2.21*
ACL221402 and ACL221326	-3.15**	-3.75**	-0.33ns	-3.70**	5.80**
ACL221402 and ACL231312	0.48ns	0.32ns	-1.09ns	1.03ns	-1.03ns
ACL221326 and ACL231312	1.63ns	1.33ns	-1.43ns	1.72ns	-1.60ns

Information: (*) *t*-value significant at 0.05, (**) *t*-value significant at 0.01 and (ns) *t*-value not significant. (WF) fruit weight, (FD) fruit diameter, (FL) fruit length, (FFT) fruit flesh thickness, (FTSS) fruit total soluble solids.

The main genotype characteristics or markers are those with high economic value such as fruit size, fruit weight, aroma, and sweetness. Fruit weight, shape, skin pattern, seed characteristics, sugar content, and other morphological traits are key markers in melon production that determine quality and market appeal. Higher weights often indicate larger yields, although mini melons are also in demand. The round or elliptical shape and the dark green stripe pattern on the rind are favored for their attractive appearance. Small to medium seed size is more common in commercial varieties due to ease of consumption. High sugar content, measured through the Brix index, is a key factor in fruit quality assessment. Other traits such as stem length and number of male flowers are also important in determining yield potential and genetic diversity (Akrami and Arzani, 2019; Lestari and Waluyo, 2022). However, it also needs to be understood that these expressions are influenced by many components, namely genotype, environment, and interactions between genotypes are factors that affect the diversity or differences in yield characters between inbreds (Hermanto et al., 2017).

Conclusion

The inbred strains ACL211390, ACL221402, ACL221326, and ACL231312 were able to accept both their own pollen and the pollen of the 5 inbred strains of the male parents. The percentage of pollination success between the combinations of inbred strains ACL211390, ACL221402, ACL221326, and ACL231312 showed varying values and was not 100% in all samples obtained. The differences in the success of the pollination methods (self-pollination and cross-pollination) were not significant, but the differences in fruit yield (fruit weight, fruit diameter, fruit

length, fruit flesh thickness, and fruit total soluble solids) were higher in cross-pollination than in self-pollination with the same female inbreds. There were differences in phenotypic performance (fruit weight, fruit diameter, fruit length, fruit flesh thickness, and total fruit soluble solids) for some characters produced between inbred lines ACL211390, ACL221402, ACL221326, and ACL231312. The cross-pollination success rate and high fruit yield of genotypes ACL211390, ACL221402, ACL221326, and ACL231312 make them suitable as parents for hybrid production.

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EVALUACIJA PROIZVODNIH OSOBINA F3 INBRED LINIJA DINJE (*CUCUMIS MELO* L.) DOBIJENIH UNAKRSNIM OPRAŠIVANJEM I SAMOOPLODNJOM

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R e z i m e

Ovo istraživanje ima za cilj da utvrdi procenat oplodnje i proizvodne osobine nekoliko F3 inbred linija dinje dobijenih unakrsnim oprašivanjem i samooplodnjom. U istraživanju koje je sprovedeno 2021. i 2022. godine korišćen je rasad devet roditeljskih inbred linija dinje od kojih su 4 bile ženske (ACL211390, ACL221402, ACL221326 i ACL231312), a 5 muških (ACD211303, ACD211254, ACD221362, ACD231380 i ACL21402). Generalno, procenat uspešnosti oplodnje pokazao je različite vrednosti, a vrednost od 100% nije postignuta ni u jednom ispitivanoj kombinaciji. Ovo je bilo zbog toga što je oplodnja 3 hermafroditna cveta (ženski roditelj) na svakom uzorku bila izvedena u različitim vremenskim intervalima. Rezultati posmatranja proizvodnih osobina (masa ploda, prečnik ploda, dužina ploda, debljina mesa i ukupna rastvorena čvrsta materija ploda) pokazali su različite vrednosti između kombinacija oprašivanja kod istog ženskog roditelja. Izvori polena su odgovorni za razlike kod proizvodnih osobina između kombinacija oprašivanja sa istim ženskim roditeljem. Studentov t-test je pokazao da između inbred linija ACL211390, ACL221402, ACL221326 i ACL231312 (ženski roditelj) nije bilo značajnih razlika u prosečnom procentu uspešnosti oprašivanja, ali da su postojale značajne do veoma značajne razlike u nekoliko proizvodnih osobina. Razlike u proizvodnim osobinama bile su rezultat razlike u sastavu genetskog materijala između inbred linija ACL211390, ACL221402, ACL221326 i linije ACL231312.

Ključne reči: unakrsno oprašivanje, inbred linija, dinja, samooplodnja, oprašivanje.

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