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Growth and Yield of Sweet Corn Hybrids Organically Grown During the Dry Season in the Midland with Monsoon Rainfall Pattern

Rike Faradilla[1], Mohammad Chozin[1,✉], Sigit Sudjatmiko[1], Fahrurrozi Fahrurrozi[1]

[1] Department of Crop Production, Faculty of Agriculture, University of Bengkulu, INDONESIA.

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Corresponding Author:
✉ mchozin@unib.ac.id
(Mohammad Chozin)

ABSTRACT

The comprehensive evaluation of sweet corn hybrids developed for organic production n needs to be conducted across different environmental conditions prior to their adoption by farmers. This study aimed to assess and compare the growth and yield of 17 sweet corn hybrids grown organically in a midland region characterized by a monsoon rainfall pattern. It was conducted during the dry season from July to October 2024 in Sumber Pakis Village, Pakis District, Malang Regency, East Java Province at an altitude of 550 m above sea level. The experiment was designed in a randomized complete block design with three replications and involved 17 sweet corn hybrids as the treatments. Data were collected for the plant growth performance and the ear yield characteristics. In general, the findings of the study suggest that the dry season that took place throughout the growing period led to drought stress, which negatively impacted the performances of sweet corn plants, including growth and ear yield characteristics of most of the hybrids evaluated. The exception was Caps 22 × Caps 23, which had the ability to maintain normal growth performance. Likewise, only Caps 2 × Caps 5, Caps 5 × Caps 17B, Caps 17B × Caps 23, Caps 22 × Caps 23, and Paragon still produced notable marketable ears.

1. INTRODUCTION

The climate of Indonesia can be categorized into two primary types based on rainfall distribution: the seasonal zone, also known as the monsoon zone, and the wet tropical zone, referred to as the non-monsoon zone (Ardhitama & Sholihah, 2014). Regions that exhibit a distinct contrast between the dry season and the rainy season are classified as seasonal zones (ZOM), whereas regions that maintain a consistent rainfall pattern throughout the year, or that may even experience two peaks of rainfall, are designated as non-monsoon zones (Non-ZOM) (Makmur *et al*., 2013). Additionally, it is observed that air temperature tends to decrease with increasing altitude, approximately by 0.6 °C for every 100 meters of elevation (Istiawan & Kastono, 2019).

Sweet corn is a plant species that prefers warm weather conditions. The best temperature for its growth lies between 21 ºC and 30 ºC (Setiawati *et al*., 2021). This plant can be grown at altitudes from 50 to 1800 m above sea level (Dialista & Sugiharto, 2017). Previous studies indicate that as the elevation of the planting site increases, the lifespan of the plant extends, the requirement for growing degree-days decreases, the ear yield increases, and the harvest index declines (Sudjatmiko & Chozin, 2024). Sweet corn production is usually carried out year-round to ensure a continuous supply for fresh markets. However, meeting water needs for plants is often a challenge in areas in the monsoon zone, especially during the dry season. In conditions of water shortage, sweet corn plants experience drought stress which is characterized by symptoms of curled leaves followed by changes in leaf color to brownish yellow and stalks becoming stunted, thus causing a decrease in yield and quality of yield when compared to previous study that did not experience drought stress (Hutasoit *et al*., 2020).

In response to the growing public consciousness regarding health and environmental issues, organic crop production is viewed as a viable alternative for food supply that does not rely on synthetic chemicals like fertilizers and pesticides. Nevertheless, organic production system faces challenges, particularly in providing plant nutrients from organic materials, which necessitate substantial quantities (Charina *et al*., 2018). Similarly, not every variety bred for conventional production demonstrates high productivity when grown organically (Kriswanto *et al*., 2016). Ideally, the seeds utilized or organic production should originate from varieties specifically bred for this purpose, as is currently being developed at Bengkulu University.

The objective of the present study was to compare the growth performance and yield as well as the yield quality of 17 organic sweet corn hybrids, consisting of 15 experimental hybrids developed for organic cultivation and 2 commercial hybrids as check varieties. The expected benefit is to achieve a thorough evaluation of the agronomic performances and yield quality of sweet corn hybrids as grown during the dry season in midland regions with monsoon rainfall patterns. The resulting information, in turn, can serve as the basis for selection to obtain hybrids that are adaptive in organic production in the regions with similar conditions.

2. MATERIALS AND METHODS

2.1. Experimental Time and Site

The study was carried out during the dry season from July to October 2024 in Sumber Pasir Village, Pakis District, Malang Regency, East Java Province with an elevation of 550 meters above sea level with weather conditions as presented in Table 1.

Table 1. Weather conditions at the experimental area during the study

Weather element	July	August	September	October
Average daily temperature (°C)	25	26	28	29
Daily humidity (%)	85	78	75	76
Monthly rainfall (mm)	42	11	23	43

2.2. Experimental Design

A randomized complete block design with three replications was employed to allocate 17 sweet corn hybrids, consisted of 15 experimental hybrids and two check varieties of commercial hybrids on the 3 m × 3 m experimental plots. The observations were made on various variables including plant height, leaf count, stalk diameter, and characteristics of both unhusked and husked ears (such as length, diameter, and weight), as well as kernel arrangement and sweetness. The collected data were subjected to analysis of variance using SAS V9.4 software (SAS Institute Inc., Cary, NC). The Scott-Knott cluster analysis was performed using DSAASTAT (Onofri, 2010) for hybrid grouping.

2.3. Crop Management

Seeds from each hybrid were row-planted on the assigned experimental plot that was fertilized with cow manure at 5 t/ha a week earlier. The seeds were sown at a depth of 2.5 cm and spaced 25 cm within rows and 75 cm between rows to obtain a population of 48 plants within each plot. Further crop management was carried out according to the organic management system, namely using granular organic fertilizer to meet plant nutrient needs and organic pesticides to control plant pests and diseases. The plants water needs were only supplied from the irrigated water scheduled in rotation every two weeks. Harvest was made at 75-80 DAP (days after planting) as the plant reached the milk stage, the silks were dried and turning brown, the ear's husk was dark green, and the ear was fully filled and dense.

3. RESULTS AND DISCUSSION

3.1. Overall Plants Appearance

Drought occurred during the plant growth period along with exacerbated by limited water supply resulted in drought stress. This phenomenon hinders normal physiological processes, including reduced cell turgidity, reduced photosynthetic activity, altered oxidative metabolism, and effectuated membrane instability (Fahad *et al*., 2017). The symptoms of drought stress were not clearly detected in the initial phase, but they become increasingly apparent in the following phases, namely reduced growth, leaf wilting, premature leaf drying, and other visible symptoms (Figure 1).

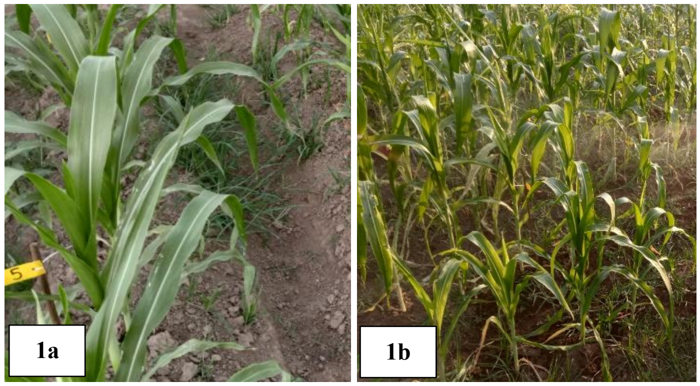

Figure 1. Plants appearance in early phase of drought stress (a) and in the following phases (b).

3.2. Plant Growth Performance

The analysis of variance showed that the tested hybrids exhibited significant variation in the growth performance as manifested in the plant height, number of leaves, and stalk diameter (Table 2). This implies that the genetic compositions of the planting materials played a very important role in the plant growth performance. Similar findings were reported in the previous studies by Chozin *et al*. (2018) and Hutasoit *et al*. (2020), even though the agro-climatic characteristics of the locations were different.

Table 2. Mean square values from the analysis of variance for the observed plant growth characteristics

Variable	Mean Square		
	Block	Hybrid	Error
Plant height	10.23 ns	765.22 **	3.85
Number of leaves	0.63 *	2.08 **	0.09
Stalk diameter	0.004 ns	6.35 **	0.03

Note: * = significant at $p < 0.05$ and ** = significant at $p < 0.001$; ns = not significant.

A closer inspection of the mean values of the observed plant growth characteristics (Table 3), indicated that the growth performance was lower than that reported by Chozin *et al*. (2018). This difference suggests that drought stress resulted in the reduced the growth of vegetative parts of the plants. This finding is also supported by Rou *et al*. (2020).

Based on the plant height that varies from 151.8 cm to 207.9 cm, the hybrids can be classified into eight distinct groups. Caps 22 x Caps 23 identified as the hybrid exhibiting the tallest plant height, followed by Caps 3 x Caps 17B and Caps 17B x Caps 23. Nevertheless, when applying the threshold of 190 cm to define a tall plant, two additional hybrids, specifically Caps 3 x Caps 17B and Caps 5 x Caps 22, also fulfilled this criterion. In addition to the genetic differences, the variations in plant height among the hybrids also partially indicate their tolerance to drought stress. It has been a common phenomenon that plant height can serve as an indicator of tolerance to drought stress, where less tolerant genotype tended to have a shorter stature (Ilmawan *et al*., 2019).

The hybrids can also be classified into 4 groups based on the number of leaves, which ranged from 10.5 to 13.2 leaves. Caps 22 x Caps 23, Caps 15 x Caps 17B, Caps 2 x Caps 17A, Paragon, and Bonanza are classified as the hybrid group having the largest number of leaves. On the other hand, Caps 5 x Caps 22, Caps 15 x Caps 17A, and Caps 15 x Caps 22 as a hybrid group have the fewest number of leaves. In the absence of drought stress, sweet corn generally produces 10 to 18 leaves. Therefore, the formation of 10 to 13 leaves found in this study may still suggest that the limited water supply during the plant life did not significantly impact the reduction in leaf count.

Table 3. Mean values of plant growth characteristics of 17 sweet corn hybrids

No.	Hybrid	Plant height (cm)	Number of leaves	Stalk diameter (mm)
1	Caps 2 x Caps 5	173.7 e	11.1 d	17.9 b
2	Caps 2 x Caps 22	186.0 d	11.4 c	18.2 a
3	Caps 3 x Caps 17A	151.8 h	11.5 c	15.6 c
4	Caps 5 x Caps 17B	165.9 f	11.4 c	15.5 c
5	Caps 5 x Caps 22	192.3 c	10.9 d	16.5 c
6	Caps 15 x Caps 17A	165.2 f	10.5 d	17.4 b
7	Caps 15 x Caps 22	184.9 d	10.7 d	15.6 c
8	Caps 15 x Caps 23	184.4 d	11.7 c	14.7 c
9	Caps 17A x Caps 17B	171.7 e	11.3 c	16.2 c
10	Caps 17B x Caps 22	193.3 c	11.1 d	17.2 b
11	Caps 17B x Caps 23	198.6 b	11.5 c	18.1 a
12	Caps 22 x Caps 23	207.9 a	12.2 b	16.3 c
13	Caps 3 x Caps 17B	200.9 b	11.8 c	17.7 b
14	Caps 15 x Caps 17B	169.0 e	13.2 a	20.0 a
15	Caps 2 x Caps 17A	188.2 d	13.1 a	16.9 b
16	Paragon	157.3 g	12.4 a	19.4 a
17	Bonanza	170.7 e	13.0 a	18.4 a

Note: mean values followed by same letters in the columns belong to the same grouping by Scott-Knott's test at the 0.05 probability level.

Using the same method of mean separation, the hybrids can also be divided into 3 groups based on stalk diameter, which ranged from 16.3 mm to 20 mm. The hybrids Caps 2 x Caps 22, Caps 17B x Caps 23, Caps 15 x Caps 17B, Paragon, and Bonanza belong to the group of hybrids that have large stalk diameter with a diameter greater than 18 mm. On the other hand, Caps 3 x Caps 17A, Caps 5 x Caps 17B, Caps 5 x Caps 22, Caps 15 x Caps 22, and Caps 15 x Caps 23 belong to the group of hybrids that have small stalks with a diameter smaller than 16 mm. Sweet corn stalks generally have a diameter in the range of 16 mm to 27 mm when water availability for the plant is not a limitation (Hutasoit *et al*., 2020). As previously reported by Shahrokhi *et al*. (2021) that drought stress caused the stalk diameter to become smaller, however the present findings indicated that reduction rate is not large enough and varies between hybrids. By referring to the appearance of plant growth characteristics without drought stress, only Caps 22 x Caps 23 is a hybrid that is able to show normal growth in water-limited environments.

3.3. Ear yield characteristics

In contrast to the growth characteristics, a notable variation among the hybrids was observed solely in one trait related to ear yield, specifically ear length (Table 4). This observation diverges from the findings of Sela *et al*. (2019), which indicated that the hybrids exhibited significant variations on ear yield and nearly all yield-related characteristics. The limited variations in most characteristics suggest that the hybrids did not fully express their genetic potential, which contradicts the results reported by Azrai *et al*. (2016).

Table 4. Mean square values from the analysis of variance for the ear yield characteristics

Variable	Mean Square		
	Block	Hybrid	Error
Unhusked ear length	12.19 ns	14.47 *	4.49
Unhusked ear diameter	29.82 ns	21.38 ns	19.22
Unhusked ear weight	3559.44 ns	2302.09 ns	2816.51
Husked ear length	4.61 ns	3.74 ns	3.05
Husked ear diameter	1456.99 ns	1234.04 ns	1608.25
Husked ear weight	14.64 ns	16.82 ns	11.50

Note: * = significant at $p < 0.05$ and ns = not significant.

The variation in the length of unhusked ears, ranging from 23.1 cm to 30.2 cm, leads to the categorization of hybrids into three distinct groups based on this character (Table 5). Since sweet corn is typically marketed as unhusked or green ears, the income generated from crop production is influenced not only by the total weight of the harvested ears but also by the ear attributes that satisfy market requirements, referred to as marketable ears. A green ear is considered marketable if it has acceptable overall ear characteristics, including size and weight, as demonstrated by five hybrids, namely Caps 2 x Caps 5, Caps 5 x Caps 17B, Caps 17B x Caps 23, Caps 22 x Caps 23, and Paragon.

Table 5. Mean values of ear yield characteristics of 17 sweet corn hybrids

Hybrid	Unhusked ear			Husked ear			Ear yield (t/ha)
	Length (cm)	Diameter (mm)	Weight (g)	Length (cm)	Diameter (mm)	Weight (g)	
Caps 2 x Caps 5	27.4 a	54.2	243.7	19.0	46.6	178.6	13.0
Caps 2 x Caps 22	27.9 a	51.2	232.0	19.3	42.8	165.1	12.4
Caps 3 x Caps 17A	23.8 c	48.1	177.3	15.4	41.4	129.5	9.5
Caps 5 x Caps 17B	28.2 a	54.6	261.9	19.6	47.6	188.5	14.0
Caps 5 x Caps 22	30.2 a	52.4	231.6	18.5	44.5	149.0	12.4
Caps 15 x Caps 17A	24.7 b	47.4	185.3	17.0	41.7	135.0	9.9
Caps 15 x Caps 22	27.3 a	50.9	227.1	18.9	43.6	161.3	12.1
Caps 15 x Caps 23	25.5 b	53.7	223.3	17.1	42.4	158.6	11.9
Caps 17A x Caps 17B	24.9 b	46.4	181.3	18.5	39.9	131.5	9.7
Caps 17B x Caps 22	27.3 a	49.4	208.8	17.9	43.1	143.2	11.1
Caps 17B x Caps 23	28.9 a	53.2	251.7	19.5	44.5	161.2	13.4
Caps 22 x Caps 23	30.2 a	53.6	249.3	19.2	44.9	167.6	13.3
Caps 3 x Caps 17B	25.4 b	48.6	229.8	17.2	40.7	163.7	12.3
Caps 15 x Caps 17B	23.7 c	47.9	175.6	17.1	38.8	115.0	9.4
Caps 2 x Caps 17A	26.3 b	54.0	241.6	18.5	44.5	173.4	12.9
Paragon	28.2 a	51.3	244.3	18.7	46.0	180.0	13.0
Bonanza	23.1 c	50.2	212.7	18.1	43.5	169.4	11.3

Note: mean values followed by same letters in the columns belong to the same grouping by Scott-Knott's test at the 0.05 probability level; ear yield = approximation from unhusked ear weight.

3.4. Kernel Arrangement and Sweetness

Further observation of the husked ear indicated that there was considerable variation in kernel sweetness among the hybrids; however, no significant differences were observed in terms of kernel row number and the number of kernels per row (Table 6). This observation suggests that while the hybrids exhibited similar kernel formation, they did not achieve equivalent total soluble solid concentrations that dictate the sweetness of the kernel when subjected to restricted water availability during the growth phases.

Table 6. Middle squares of analysis of variance for outcome quality

Variable	Mean Square		
	Block	Hybrid	Error
Kernel row number	0.76 ns	2.19 ns	1.31
Kernel number per row	82.96 *	17.86 ns	22.10
Kernel sweetness	19.65 **	1.97 *	0.98

Note: * = significant at $p < 0.05$ and ** = significant at $p < 0.001$; ns = not significant.

The configuration of kernels within the ear is a significant attribute for sweet corn, as it affects both the overall quality and visual appeal of the ear, thereby influencing consumer interest and processing efficiency. A standard quality ear typically contains between 12 and 16 rows of kernels, with approximately 30 to 50 kernels per row (Ortez *et al*., 2022), a criterion that can be satisfied by the five hybrids.

The kernel sweetness, which varies from 10.5 °brix to 13.4 °brix, indicates that a deficit in plant water due to drought has resulted in a decrease in sugar content within the kernel. While moderate drought conditions may enhance sugar levels in kernels, severe and extended drought can lead to a reduction, thereby affecting kernel sweetness (Zargar *et al.*, 2025). In the absence of water scarcity, kernel sweetness typically falls between 16 °brix and 20 °brix

(Mehta *et al*., 2020). Nonetheless, despite these constraints, the sweetness levels of the five hybrids are still relatively high when compared to other hybrids.

Table 7. Average ear quality of 17 sweet corn hybrids

Hybrid	Kernel row number	Kernel number per row	Kernel sweetness (°brix)
Caps 2 x Caps 5	12.9	29.8	12.5 a
Caps 2 x Caps 22	12.1	35.3	12.4 a
Caps 3 x Caps 17A	13.9	31.7	13.4 a
Caps 5 x Caps 17B	13.1	33.5	13.4 a
Caps 5 x Caps 22	12.3	31.9	12.5 a
Caps 15 x Caps 17A	13.1	32.9	12.9 a
Caps 15 x Caps 22	12.7	36.1	12.9 a
Caps 15 x Caps 23	14.1	34.1	12.3 b
Caps 17A x Caps 17B	13.7	35.7	11.1 b
Caps 17B x Caps 22	13.0	30.3	11.6 b
Caps 17B x Caps 23	15.1	37.2	11.3 b
Caps 22 x Caps 23	14.0	34.8	11.1 b
Caps 3 x Caps 17B	13.1	33.3	10.5 b
Caps 15 x Caps 17B	12.3	29.1	11.5 b
Caps 2 x Caps 17A	12.3	36.1	12.3 b
Paragons	13.1	30.9	13.1 a
Bonanza	14.7	35.1	12.3 b

Note: mean values followed by same letters in the columns belong to the same grouping by Scott-Knott’s test at the 0.05 probability level.

4. CONCLUSION

The production of organic sweet corn in the monsoon zone during the dry season significantly affects growth performance, ear yield, and the quality of the ear, which is suboptimal due to drought stress. Among the 17 hybrids evaluated, only hybrid Caps 22 x Caps 23 demonstrated relatively normal growth performance. Similarly, the only hybrids Caps 2 x Caps 5, Caps 5 x Caps 17B, Caps 17B x Caps 23, Caps 22 x Caps 23, and Paragon were able to produce marketable ears of notable quality. These results indicate that organic sweet corn production in regions experiencing an extended dry season should be conducted when water resources are sufficient to meet the plants' requirements.

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REFERENCES

Ardhitama, A., & Sholihah, R. (2014). Kajian penentuan awal musim di daerah non ZOM 14 Riau dengan menggunakan data curah hujan dan hari hujan. *Jurnal Sains dan Teknologi Modifikasi Cuaca, **15***(2), 15-23. https://doi.org/10.29122/jstmc.v15i2.2672

Azrai, M., Efendi, R., Suwarti, S., & Praptana, R.H. (2016). Keragaman genetik dan penampilan jagung hibrida silang puncak pada kondisi cekaman kekeringan. *Jurnal Penelitian Pertanian Tanaman Pangan*, ***35***(3), 199-208.

Charina, A., Kusumo, R.A.B., Sadeli, A.H., & Deliana, Y. (2018). Faktor-faktor yang mempengaruhi petani dalam menerapkan standar operasional prosedur (SOP) sistem pertanian organik di Kabupaten Bandung Barat. *Jurnal Penyuluhan*, ***14***(1), 68–78. https://doi.org/10.25015/penyuluhan.v14i1.16752

Chozin, M., Sudjatmiko, S., Fahrurrozi, F., Setyowati, N., & Muktamar, Z. (2018). Hybrid performances and heterosis in sweet corn as grown under organic crop management in tropical highland climate. *International Journal of Agricultural Technology, **14***(6), 815–832.

Dialista, R., & Sugiharto, A.N. (2017). Keragaan jagung manis (*Zea mays* L. saccharata Sturt) terhadap dua ketinggian tempat. *Plantropica Journal of Agricultural Science*, ***2***(2), 155–163.

Fahad, S., Bajwa, A.A., Nazir, U., Anjum, S.A., Farooq, A., Zohaib, A., Sadia, S., Nasim, W., Adkins, S., Saud, S., Ihsan, M.Z., Alharby, H., Wu, C., Wang, D., & Huang, J. (2017). Crop production under drought and heat stress: Plant responses and management options. *Frontiers in Plant Science*, ***8***, 1147. https://doi.org/10.3389/fpls.2017.01147

Hutasoit, R.I., Setyowati, N. & Chozin, M. (2020). Pertumbuhan dan hasil delapan genotipe jagung manis yang dibudidayakan secara organik di lahan rawa lebak, *Jurnal Ilmu-Ilmu Pertanian Indonesia,* ***22***(1), 45–51. https://doi.org/10.31186/jipi.22.1.45-51

Ilmawan, E., Subaedah, S. & Takdir, A. (2019). Analisis keragaan genetik jagung toleran cekaman kekeringan di lahan sawah tadah hujan, *Jurnal Ilmiah Ilmu Pertanian*, ***2***(2), 39–47. https://doi.org/10.33096/agrotek.v2i2.60

Istiawan, N.D. & Kastono, D. (2019). Pengaruh ketinggian tempat tumbuh terhadap hasil dan kualitas minyak cengkih (*Syzygium aromaticum* (L.) Merr. *Vegetalika Journal*, ***8***(1), 27–41.

Kriswanto, H., Safriyani, E., & Syamsul, B. (2016). Pemberian pupuk organik dan pupuk npk pada tanaman jagung manis (*Zea mays saccharata* Strut). Jurnal Klorofil, ***9***(1), 1-6.

Makmur, E.E.S., Koesmaryono, Y., Aldrian, E., & Wigena, A.H. (2013). Model prediksi awal musim hujan di sentra padi Pantura Jabar dengan prediktor regional dan global. *Jurnal Meteorologi dan Geofisika,* ***14***(3), 127–137. https://doi.org/10.31172/jmg.v14i3.164

Mehta, B.K., Muthusamy, V., Baveja, A., Chauhan, H.S., Chhabra, R., Bhatt, V., Chand, G., Zunjare, R.U., Singh, A.K., & Hossain, F. (2020). Composition analysis of lysine, tryptophan and provitamin-A during different stages of kernel development in biofortified sweet corn. *Journal of Food Composition and Analysis*, ***94***, 103625. https://doi.org/10.1016/j.jfca.2020.103625

Onofri, A. (2010). *DSAASTAT a new Excel® VBA macro to perform basic statistical analyses of field trials*. Department of Agriculture and Environmental Sciences, University of Perugia, Italy.

Rou, E.K.S., Zamri, A.N., & Sam, L.M. (2020). Effects of drought stress on the growth, yield and physiological traits of thai super sweet corn. *Journal of Tropical Plant Physiology*, ***12***(1), 27-37. http://dx.doi.org/10.56999/jtpp.2020.12.1.3

Sela, T.M., Chozin, M., Suharjo, U.K.J., & Setyowati, N. (2019). Pengujian 13 jagung manis hibrida di ultisol. *Agrin*, ***23***(2), 168–178.

Setiawati, S.B.M., Dermiyati, D., Arif, M.A.S., & Yusnaini, S. (2021). Pengaruh pemberian pupuk organonitrofos plus, pupuk anorganik, dan kombinasinya terhadap biomassa karbon mikroorganisme (C-mik) pada tanah Utisols Taman Bogo yang ditanami jagung manis (*Zea mays* [L.] Saccharata Sturt). *Jurnal Agrotek Tropika*, ***9***(1), 102-111. https://doi.org/10.23960/jat.v9i1.4756

Shahrokhi, M., Khavari-Khorasani, S., Ebrahimi, A., Majidi-Heravan, E., & Kermani, M. (2021). Path analysis of yield and yield components in super sweet maize (*Zea mays* L. var. Saccarata) inbred lines at drought-stress and normal conditions. *Journal of Plant Physiology and Breeding*, ***11***(2), 87–96.

Sudjatmiko, S. & Chozin, M. (2024). Phenological, growth, and yield responses of sweet corn to elevational air temperatures in the humid tropics. *Australian Journal of Crop Science,* ***18***(2), 92–98. https://doi.org/10.21475/ajcs.24.18.02.PNE4072

Ortez, O.A., McMechan, A.J., Hoegemeyer, T., Ciampitti, I.A., Nielsen, R., Thomison, P.R., & Elmore, R.W. (2022). Abnormal ear development in corn: A review. *Agronomy Journal*, ***114***, 1168–1183. https://doi.org/10.1002/agj2.20986

Zargar, T B., Sobh, M., Basal, O., Janda, T., Pál, M., & Veres, S. (2025). Spermine driven water deficit tolerance in early growth phases of sweet corn genotypes under hydroponic cultivation. *Scientific Reports*, ***15***(1), 1796. https://doi.org/10.1038/s41598-025-86083-y