

**COMBINATION OF PLANTING METHODS AND MULTIPLE NPK
FERTILIZER ON PLANT GROWTH AND PRODUCTION
SWEET CORN (*Zea mays saccharata* S.)**

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ABSTRAK

Penelitian ini bertujuan untuk mendapatkan perbedaan respon dari pertumbuhan dan hasil produksi dari tanaman Jagung Manis (*Zea mays saccharata* Sturt) dengan menggunakan sistem tanam satu baris dan sistem tanam dua baris. Penelitian ini dilaksanakan Kelurahan Sukajadi, Kabupaten Banyuasin, Provinsi Sumatera Selatan. Waktu penelitian pada bulan Januari. Penelitian ini menggunakan Rancangan petak terbagi (Split plot design) dengan 8 kombinasi perlakuan yang di ulangi sebanyak 4 kali. Adapun faktor perlakuan yang dimaksud adalah sebagai berikut: Petak Utama : Sistem Tanam Satu Baris (S₁), Sistem tanam Dua Baris (S₂), P₀: Tanpa perlakuan, P₁: NPK: 60g (petak) P₂: NPK: 120g (petak) P₃: NPK: 180g (petak). Peubah yang diamati dalam penelitian ini adalah tinggi tanaman / tanaman (cm), panjang tongkol berbiji / tanaman (cm), berat tongkol/pertanaman (gr) produksi perpetak / petak (kg). Berdasarkan hasil penelitian menunjukkan bahwa perlakuan dengan sistem tanam dua baris (DB) dan pemberian pupuk NPK majemuk 300kg/ha memberikan pengaruh terbaik terhadap produksi jagung manis sebesar 12,96 kg/petak atau setara dengan 17,28 ton/ha.

Kata Kunci : Cara Tanam, Jagung Manis, NPK Majemuk

ABSTRACT

This study aims to obtain differences in the response of growth and yield of Sweet Corn (*Zea mays saccharata* Sturt) using a single row planting system and a two row planting system. This research was conducted in Sukajadi Village, Banyuasin Regency, South Sumatra Province. Research time in January. This study used a split plot design with 8 treatment combinations which were repeated 4 times. The treatment factors in question are as follows: Main Plot : Single Row Planting System (S₁), Two Row Planting System (S₂), P₀: No treatment, P₁: NPK : 60g (plot) P₂: NPK : 120g (plot) P₃ : NPK : 180g (plot). The variables observed in this study were plant height/plant (cm), length of seed cob/plant (cm), cob weight/plant (gr), production of plots/plot (kg). Based on the results of the study, it was shown that the treatment with a two-row planting system (DB) and application of 300kg/ha compound NPK fertilizer gave the best effect on sweet corn production of 12.96 kg/plot or equivalent to 17.28 tons/ha.

Keyword : Compound NPK, Planting Method, Sweet Corn

INTRODUCTION

Sweet corn is one of the most popular vegetable commodities in America, Canada and Asia, one of which is Indonesia. In Indonesia, sweet corn has been known since the 1980s [1]. Corn production centers are spread across various regions in Indonesia such as Central Java, East Java and Madura, then it is widely planted outside Java [2].

One way to improve cultivation techniques is to adjust the planting system. The use of the right cropping system can be an important factor to get high yields, because the cropping system determines the number and population of plants per unit area [3].

The setting of the planting system is related to the spacing used. If the spacing is too wide, it is less efficient in land use, if it is too narrow, there will be high competition and result in low productivity. The regulation of plant population density and spacing of cultivated plants is intended to suppress competition between plants [4].

According to the research results of [5], stated that the single row cropping system resulted in the best growth and production with the best

average plant height of 215.65 cm and cob weight of 642 g/cob and without husks, respectively, and 574.5g/cob.

In addition to regulating the cropping system, one of the efforts that can be made to increase sweet corn production can be done by providing or adding nutrients, namely through fertilization.

There are two types of fertilizers, namely organic fertilizers and organic fertilizers. To accelerate the absorption of nutrients in plants, organic (chemical) fertilizers can be given. Pearl NPK fertilizer is also known as compound fertilizer because it contains more than 2 types of main nutrients, with nutrient content of N (15%) in the form of NH_3 , P (15%) in the form of P_2O_5 and K (15%) in the form of (K_2O) .

Phosphorus (P) plays an important role in energy transfer in plant cells, promotes root development and early fertilization, strengthens stems so that they do not fall easily, and increases N uptake at the beginning of growth. The element potassium (K) also plays a very important role in plant growth, for example to stimulate the translocation

of carbohydrates from leaves to plant organs [6]. [7] argues that the recommended dose of compound NPK fertilizer for sweet corn is 150 kg/ha, with a yield of 13 tons/ha.

RESEARCH METHOD

Place and time of research

The research was carried out in Sukajadi Village KM 15, Talang Kelapa District, Banyuasin Regency, South Sumatra Province. The time of the study was carried out from November to January 2020.

Materials and Tools

The materials used in this study were sweet corn of Master sweet variety, compound NPK fertilizer, chicken manure, dolomite, and fungicides. Meanwhile, the tools used in this study were hoe, machete, waring, hose, water pump, meter, rafiah rope, wooden tug, stenlis knife, nameplate, gembor, and scales.

Research Design

RESULTS AND DISCUSSION

Plant Height

The results of the analysis of variance showed that the cropping system treatment had no significant effect on plant height variables, while

This study used a split-plot design with 8 treatment combinations which were repeated 4 times with a total of 32 plots. The treatment factors in question are as follows:

Factor I: Planting System (S), with 2 types of planting system, namely: S1: 1 row planting system and S2: Two row planting system.

Factor II : Compound NPK fertilizer dosage (P) with 4 treatments in the number of doses, namely P0: no treatment (control), P1: 100Kg/Ha or 60gr/plot, P2: 200Kg/Ha or 120 gr/plot, P3: 300 Kg /Ha or 180gr/plot.

The sequence of research implementation starts from land preparation, land management, planting, fertilizing, plant maintenance, harvesting and follow-up observations. Parameters observed were plant height, weight of the ear (gr), length of the ear (cm), Production per plot (kg)

the compound NPK fertilizer dose and interaction had a very significant effect. The results of the Honestly Significant Difference (BNJ) test the effect of

treatment on plant height can be seen in Tables 1a and 1b.

Table 1a. Effect of Treatment Doses of Compound NPK Fertilizer on Corn Plant Height (cm).

Treatment (P)	Average (P)	BNJ 0,05% P = 3,40
P ₀	170,86	a
P ₁	178,38	b
P ₂	188,64	c
P ₃	203,08	d

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level.

Table 1a shows that the P₃ treatment was significantly different from the other treatments and produced the highest plant height of 203.08 cm.

Table 1b. Effect of Interaction Treatment of Average Cropping System With Compound NPK Fertilizer Doses on Corn Plant Height (cm).

Treatment (I)	Average (I)	BNJ 0,05% I = 6,23
S1P0	172,54	ab
S1P1	180,04	c
S1P2	189,48	d
S1P3	202,96	e
S2P0	169,19	a
S2P1	176,73	bc
S2P2	187,81	d
S2P3	203,20	e

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level.

Table 1b shows that the S₂P₃ interaction treatment was not significantly different from the S₁P₃ treatment but significantly different from the other treatments and resulted in the highest plant height of 203.21 cm. Table 2a shows that the P₃ treatment was significantly different from the other treatments and produced the highest cob length, which was 22.13 cm.

Table 2b. Effect of Cropping System Interaction Treatment with Compound NPK Fertilizer Doses on Corn Length (cm).

Treatment (I)	Average (I)	BNJ 0,05% I = 1,38
S ₁ P ₀	17,75	ab
S ₁ P ₁	19,00	bc
S ₁ P ₂	20,75	d
S ₁ P ₃	22,13	e
S ₂ P ₀	17,50	a
S ₂ P ₁	19,50	cd
S ₂ P ₂	20,56	d
S ₂ P ₃	22,13	e

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level.

Table 2b shows that the S₁P₃ treatment, but significantly different interaction treatment was not from the other treatments and resulted significantly different from the S₂P₃ in the highest cob length of 22.13 cm

Cob Weight Each Plant (g)

The results of the analysis of the diversity of cobs weight per plant are listed in Appendix 3b. The results of the analysis of variance showed that the cropping system treatment had no significant effect on the cob weight

variables per plant, while the compound NPK fertilizer dose and interaction had a very significant effect. The results of the Honestly Significant Difference (BNJ) test the effect of treatment on the weight of cobs per plant can be seen in Tables 3a and 3b

Table 3a. Effect of Treatment Doses of Compound NPK Fertilizer on Cob Weight of Corn Plant (g).

Treatment (P)	Average (P)	BNJ 0,05% P = 31,66
P ₀	225,34	a
P ₁	286,41	b
P ₂	325,03	c
P ₃	367,09	d

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level.

Table 3a shows that the P3 treatment was significantly different from the other treatments and produced the highest cob weight per plant, which was 367.09 g

Table 3b. Effect of Cropping System Interaction Treatment with Compound NPK Fertilizer Doses on Cob Weight Each Plant (gr).

Treatment (I)	Average (I)	BNJ _{0,05%} I = 52,84
S ₁ P ₀	224,31	a
S ₁ P ₁	288,94	b
S ₁ P ₂	321,75	bc
S ₁ P ₃	363,44	c
S ₂ P ₀	226,38	a
S ₂ P ₁	283,88	b
S ₂ P ₂	328,31	bc
S ₂ P ₃	370,75	c

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level

Table 3b shows that the S2P3 interaction treatment was not significantly different from the S1P2, S1P1 and S2P2 treatments, but was significantly different from the other treatments and produced the highest cob weight per plant, which was 370.75 g.

Cob Weight Each Plot (kg)

The results of the analysis of the diversity of cobs weight per plot are

listed in Appendix 4b. The results of the analysis of variance showed that the treatment of the cropping system, the dose of compound NPK fertilizer and the interactions had a very significant effect on the variables of cob weight per plot. The results of the Honestly Significant Difference (BNJ) test the effect of treatment on the weight of the cobs per plot can be seen in Table 4.

Table 4. Effect of Cropping System Treatment with Compound NPK fertilizer Doses on Cob Weight per Plot (kg).

Cultivation System (S)	Dosage of Compound NPK Fertilizer (P)				Average (S)
	P0	P1	P2	P3	
S ₁	6.73 a	8.67 b	9,65 bcd	10,90 cd	8,99 a
S ₂	9,06 bc	11,36de	13,13 ef	15,01 f	12,14 b
Average (P)	7,89 a	10,01 b	11,39 c	12,96 d	
BNJ _{0,05} S = 0,63	BNJ _{0,05} P = 1,20		BNJ _{0,05} I = 1,97		

Note: The numbers followed by the same letter in the same column mean that they are not significantly different at the 95% confidence level

Table 4 shows that treatment S₂ was significantly different from Treatment S₁ and produced the highest cob weight per plot, which was 12.14 kg. The P₃ treatment was significantly different from other treatments and produced the highest cob weight per plot, which was 12.96 kg. The S₂P₃ interaction treatment was not significantly different from the S₂P₂ treatment but was significantly different from the other treatments and resulted in the highest cob weight per plot of 15.01 kg.

Based on the results of soil analysis in the research area, in the soil and plant tissue analysis laboratory, PT. Sampoerna Agro Palembang (2019) showed that soil PH (H₂O) = 4.12 (very acidic) with Nitrogen (N)

content, ppm 0.31 (very low), Phosphate (P₂O₅), ppm 49.87 (high), Potassium (K), cmol/kg 0.150 (classified as) and Boron (B₂O₅), ppm 0.06 (classified as very low). From the results of the analysis of the soil where the research has a low nutrient content and reacts very acidly and the type of sandy loam soil, this is in line with [8] that the soil in the Lebak swamp land is not a marine deposit so that this soil is acidic-very acidic with (pH 4.5-6.0).

Based on the results of the research analysis showed that the treatment of the two-row planting system had a very significant effect on the weight of the cobs per plot, namely 12.14 kg, this was because the two-line planting system had a higher population of sweet corn per unit area,

resulting in more cobs cropping than the cropping system. one line. This is in line with the opinion of [9] , which states that differences in plant spacing cause differences in cob weight and cob weight differences, but do not cause differences in cob weight without corn cobs. Added by [10] the two-row planting system causes narrower spacing, which can increase the production of land area and the number of seeds.

Based on the results of field observations, it was shown that the single row cropping system gave lower yields compared to other treatments. This can be seen from the observed variables such as plant height (184.23 cm), number of leaves (11.06 strands), length of ear (19.9 cm), weight of ear per plant (299.61 g). However, it was significantly different for the weight of cobs per plot (8.99 kg). It is suspected that the single row planting system (SB) in sweet corn plants is caused by the wide spacing which causes a smaller population so that the production yield is not too high. This is in line with [11] who stated that the growth and productivity of maize was

significantly influenced by the spacing and varieties.

Based on the results of field observations, it was shown that the dose of 180g compound NPK fertilizer/plot gave the highest yield for all variables such as plant height (203.08 cm), number of leaves (11.66 strands), ear length (22.13 cm), weight cobs per plant (367.09 g) and weight of cobs per plot (12.96kg). This is because the NPK element needed by plants is sufficient so that it gives the best results on all observed variables. This is in line with [12] , that to be able to grow and produce optimally plants require the application of nitrogen (N), phosphorus (P) and potassium (K) fertilizers in sufficient and balanced quantities. Nutrients NPK is a macro nutrient that is needed by plants in a large number of plants. Added by [13] for vegetative and generative growth plants really need nutrients such as N, P, K and other elements in sufficient and balanced quantities.

Based on the results of field observations, it was shown that the dose of compound NPK fertilizer 60g/plot gave the lowest yield on all variables such as plant height

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(178.38cm), number of leaves (10.94 strands), ear length (19.25cm), cob weight per plants (286.41 g) and weight of cobs per plot (8.67 kg). This is because the NPK element needed by plants is sufficient so that it gives the best results on all observed variables. This is in line with [14] that plants will thrive if the elements (nutrients) needed are available in sufficient quantities and these nutrients are available in a form that can be absorbed by plants.

The results of the BNJ analysis showed that the cropping system treatment and the dose of NPK fertilizer had a very significant effect on all observed variables. The results of the highest interaction analysis in the growth phase were plant height for a two-row planting system and treatment with compound NPK fertilizer at a dose of 180 g/plot 203.20 cm, the number and for a two-row planting system and treatment with compound NPK fertilizer at a dose of 180 g/ 11.75 plots, while the results of the highest interaction analysis in the production phase were the length of the cob for the two-row cropping system and the treatment of applying compound NPK

fertilizer at a dose of 180 g/plot 22.13 cm, the weight of the cob per plant for the two-row planting system and the treatment given compound NPK fertilizer at a dose of 180 g/plot 370.75 grams, and the weight of cobs per plot for a two-line planting system and treatment with a compound NPK fertilizer at a dose of 180 g/plot 12.14 kg. This is due to the interaction of the two-line cropping system (DB) treatment with the application of a compound NPK fertilizer dose of 18 grams/plant to produce the highest growth and production caused by the large number of plant plant populations.

CONCLUTION

The two-row planting system gave the highest yield on the weight of sweet corn cobs with a yield of 12.14 kg or equivalent to 16.19 tons/ha. Compound NPK fertilizer at a dose of 180g per plot or 300kg/ha gave the highest yield on growth and production of sweet corn with a yield of 12.96 kg/plot or equivalent to 17.28 tons/ha. The interaction of the two-line planting system and the dose of compound NPK fertilizer of 180g/plot or 300 kg/ha resulted in the highest production of

sweet corn (*Zea mays saccharata*Sturt) to 20.01 tons/ha
which was 15.01 kg/plot or equivalent

REFERENCES

- [1] Syukur dan Rifianto. 2013. Jagung Manis P+ Solusi Permasalahan Budidaya. Penebar Swadaya. Jakarta.
- [2] Hayati M, Hayati E, dan Denni N, 2011. Pengaruh Pupuk Organik Dan Anorganik Terhadap Pertumbuhan Beberapa Varietas Jagung Manis Di Lahan Tsunami. Fakultas Pertanian Universitas Syiah Kuala, Banda Aceh.
- [3] Jumin, H.B. 1987. Dasa-Dasar Agronomi. Rajawali Pers. Jakarta.
- [4] Silaban, Purba, dan Ginting. 2013. Pertumbuhan dan Produksi Jagung Manis (*Zea mays sacaratha* Sturt) pada Berbagai Jarak Tanam dan Waktu Olah Tanah. Jurnal online Agroekoteknologi Vol 1 No 3.
- [5] Sesanti, R. N. 2016. Agribisnis Tanaman Pangan Dan Hortikultura. Sumber Belajar Penunjang PLPG 2016 Mata Pelajaran/Paket Keahlian Agribisnis Tanaman Pangan dan Hortikultura. Kementerian Pendidikan Dan Kebudayaan Direktorat Jenderal Guru dan Tenaga Kependidikan.
- [6] Aguslina, L. 2004. Dasar Nutrisi Tanaman. Rineka Cipta. Jakarta.
- [7] Panani, K.,2016. Respon pertumbuhan dan produksi tanaman jagung manis (*Zea mays saccharata* sturt) terhadap takaran pupuk hayati dan pupuk NPK majemuk.
- [8] Subagio, H. 2006. Lahan Rawa Lebak. Halaman 99-116 dalam Buku Karakteristik dan Pengelolaan Lahan Rawa. Balai Besar Litbang Sumber daya Lahan Pertanian, Bogor.
- [9] Maruapey, A. 2011. Pengaruh Jarak Tanam Dan Tanam Dan Jenis Pupuk Kandang Terhadap Pertumbuhan Gulma dan Hasil Jagung Manis. Seminar Nasional Serealia 2011. Jurusan Agronomi Fakultas Pertanian Unamin. Sorong.
- [10] Herlina. 2011. Kajian Variasi Jarak Variasi Jarak dan Waktu Tanam Jagung Manis dalam Sistem Tumpang Sari Jagung Manis (*Zea mays saccharata* Sturt) Dan Kacang Tanah (*Arachis Hypogaea* L) Indriyanto. 2008. Ekologi Hutan. PT Bumi Aksara. Jakarta.
- [11] Yulisma. 2011. Pertumbuhan dan Hasil Beberapa Varietas Jagung pada Berbagai Jarak Tanam. Penelitian Pertanian Tanaman Pangan 30 (3):196-203.

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- [12] Sumarni N, Rosliani R, Suwandi. 2012. Optimasi jarak tanaman dan dosis pupuk NPK untuk produksi jagung manis. *J Hort* 22 (2): 148-155.
- [13] Sutedjo, M.M., 2002. Pupuk dan Cara Pemupukan . Rineke Cipta. Jakarta. Hal 20-21.
- [14] Dwidjoseputro. D. 2015. Pengantar Fisiologi Tumbuhan. Jakarta : UI Press. Herlina. 2011