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Utjecaj sustava sjetve na prinos zrna kukuruza

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THE IMPACT OF SOWING SYSTEMS ON THE GRAIN YIELD OF MAIZE

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SUMMARY

A research on two maize-sowing systems was conducted on the locations Radnovac (L1) and Kujnik (L2) during 2021 and 2022. A standard sowing (SR), implying a row spacing amounting to 70 cm, was carried out by a PSK4 (S1) pneumatic vacuum-sowing machine. A sowing in the twin rows (TR), with a distance amounting to 22 cm, and a distance between the two adjacent rows amounting to 48 cm, was performed by a MaterMacc Twin Row 2, which is also a pneumatic vacuum-sowing machine (S2.). Three different maize hybrids were sown, and the sowing speed was 6 km h^{-1}. The largest and the smallest difference in the number of plants was determined in 2021 on the location L1 and amounted to 2,899 and 1,183 plants ha^{-1}. On the location L2, the number of plant differences was between 1,511 and 1,644 plants ha^{-1} in the TR sowing. In the research year 2021, no statistically significant differences in grain yield kg ha^{-1} between the sowing systems were recorded on the location L1. However, in 2022, it was statistically confirmed that sowing in the twin rows produced a higher grain yield on both locations, L1 and L2, respectively. The largest difference in yield was recorded on the L2 location in 2022.

Keywords: hybrid, maize, standard sowing, twin-row sowing, yield

INTRODUCTION

Globally, and particularly in Croatia, maize (*Zea mays* L.) is one of the most crucial agricultural crops. According to the data of the State Institute for Statistics – Plant Production (2024), in 2022 the production of maize for grain in Croatia was carried out on 268,054 ha, with a total grain production amounting to 1,641,893 tons and an average yield amounting to 6,100 kg ha^{-1}. A daily improvement in the selection procedures of maize hybrids and the development technology of production and sowing has led to a significant increase in yield in the last 30 years. The increase in maize-grain yield in the newly selected hybrids is certainly a result of their adaptation to abiotic and biotic stresses (Duvick 1997, 2005), and they particularly show their adaptation to stress at higher sowing densities. The number of seeds per unit area in sowing is considered a very important stress factor, since a competition between the different plant species, or between the different maize hybrids, is very strong (Tetio-Kagho and Gardner, 1988). Maize is traditionally grown at a row spacing amounting to 65, 70, and 75 cm, although this sowing technology increases a possibility of surface soil erosion (Vogel et al., 2026) due to a very low vegetative soil coverage considering the row spacing. With the present-day occurrence of non-recurring large amounts of precipitation occurring in a short time, an intensity of surface erosion has increased. According to Allende-Montalbán et al. (2022), a phenomenon of nutrient leaching, and especially that of nitrogen, is also observed. From being the most important macronutrient for the growth and development of plants, nitrogen has become a pollutant and a threat to the health of people and ecosystems on a local and global level. In our agroecological area, maize is sown at a row spacing amounting to 70 cm. Among the factors that influence the maize-grain yield are the arrangement of plants, as well as the iterrow spacing (Farnham, 2001). A smaller part of the area in the Republic of Croatia is sown at a row spacing amounting to 75 cm, as a result of the application of American technology (sowing at a row spacing of 30 inches), with the use of combine headers with the same harvesting-system spacing (Banaj et al., 2024). However, if maize production is performed in a climate

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area with the reduced amounts of precipitation and high average daily temperatures, a position of plants within a row becomes very important. In maize sowing, a spatial arrangement of plants within a row primarily depends on a desired number of plants ha^{-1} and the row spacing in sowing. By reducing an interrow distance in sowing with the same theoretical number of plants, there is an increase in a distance between the plants within a row, which plays an important role in the even distribution of water and nutrients between the plants (Nakarmi and Tang, 2014). A scientific knowledge about the influence of the root system on the yield components is still in a research phase. With an increase in the number of plants ha^{-1} and a decrease in row spacing, a grain yield increases, but the size and root biomass per plant decreases (Gao et al., 2021). One of the attempts to reduce the impact of climate change is the sowing of maize in double rows, known as a "twin-row technology". According to the disposable literature, the application of the twin-row technology has already started in the USA in the early 1980s, as an effort to increase the yield while increasing the sowing of a larger number of kernels per a production area. In recent history, during 2016, Faculty of Agrobiotechnical Sciences Osijek started a preliminary research on the sowing of corn on twenty-five locations throughout the Republic of Croatia. The authors Banaj et al. (2017) reported a 5.6 to 10.59% increase in the grain yield (kg ha^{-1}), if compared to a standard sowing, by sowing the maize hybrids while applying the twin-row technology. The authors Jurković et al. (2018) confirmed the test results in Bosnia and Herzegovina, where the tested hybrids achieved the grain yields higher by 3.56 to 7.66 % if compared to a standard sowing – that is, when they were sown in the double rows. On the territory of Serbia, Ogrizović (2015) reported the results of double-row sowing, whereby a yield increase of 3.26% was recorded, if compared to standard sowing. In Minnesota, Porter et al. (1997) stated that, in each year of their triennial study, the corn yields were 7.2 to 8.5 % higher when sown with an interrow distance of 50.8 and 25.4 cm than those sown in the rows of 76.2 cm. In the research, Nielsen (1998) stated that a slightly higher yield of 2.7% was obtained with the maize sown in narrow rows of 38.1 cm, if compared to the yield of corn sown in the standard rows of 76.2 cm. However, in the narrow rows, an increase in the number of broken stems was observed. In the research, Karlen and Camp (1995) stated that sowing maize in double rows increased the yields on the sandy soils in the Atlantic Coastal Plain. As a conclusion, they claimed that soil moisture is a limiting factor in the achievement of higher yields in the twin-row sowing. Likewise, subsequent to a research in the grain yield when sowing maize in the twin rows (19.1 cm) and sowing at a row spacing of 76.2 cm in Maryland and Delmarva, with a larger number of hybrids and plants ha^{-1}, Kratochvil and Taylor (2005) did not record the higher yields when sowing in the twin rows, if compared to a standard sowing method.

MATERIALS AND METHODS

Setting Up a Field Experiment

During 2021 and 2022, a research in the maize-sowing methodology was conducted on the locations Radnovac (L1) and Kujnik (L2). A standard sowing (SR) at a row spacing of 70 cm was performed by a PSK4 (S1) pneumatic vacuum-sowing machine, manufactured by Future Machines, LLC, Osijek. Sowing in the twin rows (TR) with a distance of 22 cm, and with a distance between the two adjacent rows of 48 cm, was performed by the MaterMacc Twin Row 2 (S2), which is also a pneumatic vacuum-sowing machine. The sowing of *KWS Kamparis* FAO 380 (H1), *Pioneer P0023* FAO 420 (H2), and *Pioneer P0412* FAO 520 (H3) hybrids in the examined years and on the examined locations was performed in the third decade of April at an average sowing speed of 6 km h^{-1}. A sowing depth was conditioned by the level of moisture in the soil, depending on the location and the year of research, and averagely amounting from 4 to 6 cm. On both locations, a previous crop was winter wheat with a standard soil tillage applied, consisting of a shallow disk harrowing subsequent to a winter-wheat harvest, followed by a moldboard plowing prior to winter, a shallow to medium-deep disk harrowing subsequent to winter, and a seedbed preparation prior to sowing. Fertilization was uniform during the whole experiment duration: there were the applications of 350 kg ha^{-1} 7:20:30 NPK prior to moldboard plowing, 100 kg of urea (46% N) ha^{-1} prior to vernal disk harrowing, and 200 kg of KAN (27% N) ha^{-1} with a post-emergence herbicide application. To protect the plants against the weeds, the active substances of thiencarbazone-methyl 45 g ha^{-1} and isoxaflutol 112 g ha^{-1} were applied. The experimental design at both trial sites (L1 and L2) in each year was a split-plot in 4 repetitions, with a hybrid being the main treatment and sowing pattern being a subtreatment. The basic experimental plot amounted to 112 m^2 (with the width of 5.6 m and the length of 20 m). A determination of the grain yield (kg ha^{-1}) in the tested hybrids was performed by harvesting with an eight-row combine header in 4 repetitions and weighing on a truck scale (d = 500 g) in the field. An analysis of 10 average cobs from each sowing treatment determined the proportion of grain mass in the cob and moisture content in the grain. A cob weight was determined while using an electronic balance (Kern electronic balance:, d = 10 g). Grain moisture was determined immediately after the cobs were harvested and manually crowned with a portable electronic moisture meter WILE-200, Agroelectronics, Finland. A total grain yield (kg ha^{-1}) was determined by converting to a moisture value of 14,0 %. A determination of the number of plants ha^{-1} on both locations was performed immediately prior to the harvest during the month of September. A percentage of favorable sowing spacing was determined during a developmental stage from 2 to 6 fully developed leaves (i. e., the leaves with visible collars), and in stage 12 to 16 according to the BBCH scale (Meier, 2001) while applying the ISO standard 7256/1 and 7256/2 with regard to the QFI index (which indicates the percentages of single seed drops in the range of >0.5 - ≤1.5 theoretical seed spacing; Kachman and Smith, 1995). The counting of plants in the SR was performed on the sowing plots with 2 inner rows in 4 repetitions, whereas the counting of plants was performed in 4 rows (2 twin rows) with the same number of repetitions in the TR. Sowing was performed by the sowing machine S1, with a filled seeding plate n = 22 ø 5.5 mm at a vacuum of 4.661 kPa, and by the sowing machine S2, whereby a vacuum of 4.713 kPa was achieved.

Meteorological Conditions

In a biennial period (2021 and 2022), the average total precipitation value of 502.0 mm/m^2 was recorded for the vegetation months (fourth to ninth) during the research (Table 1) for the location L1 (Radnovac). In a multiannual period (1991 to 2020), the maize vegetation months had an average of 510.5 mm/m^2. The average mean monthly air temperature (°C) in the maize vegetation period on the L1, measured at the Meteorological Station in Požega, amounted to 17.5 °C, which is +0.2 °C higher than the average mean monthly air temperature recorded by a multiannual monitoring in the 1991 – 2020 period. On the location L2 (Kujnik), a slightly lesser total average monthly precipitation of -71.5 mm/m^2 was recorded in the researched maize-growing period. The average total amount of precipitation for the 2021 – 22 period amounted to 487.6 mm/m^2, and 559.1 mm/m^2 for the multiannual average. The average mean monthly air temperature (°C) on the location L2 in the maize vegetation (fourth to tenth month) in the examined period was higher by 0.2 °C (17.5 °C) if compared to the multiannual average.

Table 1. Mean air temperatures (°C) and total monthly precipitations (mm) - location Radnovac (Meteorological Station Požega) and Kujnik (Meteorological Station Gorice)

Tablica 1. Srednje mjesečne temperature zraka (°C) i ukupne mjesečne količine oborine (mm) - lokacije Radnovac (meteorološka postaja Požega) i Kujnik (meteorološka postaja Gorice)

Months / Mjeseci	Monthly Mean Air Temperature (°C) / *Srednje mjesečne temperature zraka*				Monthly Total Precipitation (mm) / *Ukupna mjesečna količina oborina*			
	2021	2022	2021 -2022	1991 -2020	2021	2022	2021 -2022	1991 -2020
	L1 Radnovac (Meteorological station / *Meteorološka postaja* - Požega)							
IV	9.0	10.4	9.7	12.2	68.9	57.0	63.0	54.4
V	14.6	18.4	16.5	16.5	79.1	38.7	58.9	80.2
VI	22.2	22.9	22.6	20.5	101.5	85.6	93.6	82.5
VII	24.1	23.3	23.7	22.2	64.7	24.2	44.5	71.7
VIII	21.3	22.7	22.0	21.8	70.6	72.3	71.5	64.6
IX	16.6	16.2	16.4	16.4	28.4	184.2	106.3	83.1
X	9.5	13.4	11.4	11.6	120.8	7.5	64.2	74.0
Mean/Sum	16.8	18.2	17.5	17.3	534.0	469.5	502.0	510.5
	L2 Kujnik (Meteorological station / *Meteorološka postaja* - Gorice)							
IV	9.5	10.7	10.1	12.8	66.4	66.0	66.2	64.2
V	14.9	18.3	16.6	16.1	86.8	49.8	68.3	97.7
VI	22.1	22.8	22.4	20.2	8.8	96.9	52.9	89.3
VII	23.7	23.1	23.4	22	102.9	27.7	65.3	64.2
VIII	21.0	22.4	21.7	21.6	38.0	49.5	43.8	74.0
IX	16.9	16.3	16.6	16.7	44.9	222.1	133.5	90.8
X	9.5	13.9	11.7	11.8	108.2	6.9	57.6	78.9
Mean/Sum	16.8	18.2	17.5	17.3	456.0	518.9	487.6	559.1

Data: Croatian Meteorological and Hydrological Service (2023) and maize vegetation during the fourth to the tenth month (April–October)

Soil Type and a Chemical Soil Analysis

The research was conducted on the low-humus soils on the location L1 (1.73%) and the location L2 (2.30%). The plant-available phosphorus an potassium were determined by the AL-method, whereby the soil on the location L1 had 6.77 and the soil on the location L2 36.04 P_2O_5 mg/100 g of soil. Thereupon, we could classify them as a soil with a low and with a very high P_2O_5 supply. By analyzing the K_2O content values, the soil on the location L1 (12.30 mg/100 g of soil) and the soil on the location L2 (14.22 mg/100 g of soil) were classified into the group of soils with a low supply of the specified nutrient. The tested soil on the location L2 had a pH/KCL of 3.38 (a highly acidic soil). A similar value of pH/KCl (4.81) was recorded on the location L1, and that soil was classified as acidic. All values obtained from the soil analyses were interpreted according to Vukadinović & Vukadinović (2011).

Statistical Analysis

The collected data were processed by the *SAS* statistical package (SAS Enterprise Guide 7.1). For the ANOVA calculation, a split-split-split-plot design was applied, with a *year* as the main treatment, *location* as a subtreatment, *hybrid* as a sub-subtreatment and *sowing* pattern being a sub-sub-subtreatment. The treatment means which were statistically different in the ANOVA's F-test were compared by Duncan's Multiple Range Test test at the $p < 0.05$ probability level.

RESULTS AND DISCUSSION

A vacuumed seed-dosing system is a form of pneumatic seed-dosing device, that operates on the principle of transporting and releasing the seeds through a vacuumed air flow. This is currently the most widespread seed-dosing system. However, a problem of an uneven seed flow in the system has not been completely solved, especially when sowing a larger number of seeds per a unit of time (Ding et al. 2019). Kachman and Smith (1995) state that the quality of feed index (QFI) demonstrates a percentage of the achieved spacings at sowing that are smaller or larger than a half of the theoretical spacings. The values of the determined QFI index at the time of sowing by year and locality and by the applied hybrids are figured in Table 3. As stated by Kachman and Smith (1995), if the sowing machine achieves > 98.6% of acceptable distances (QFI index) during sowing, we can classify it in a category of very good sowing machines. According to the data on a realized QFI in the trials by Banaj et al. (2020), both sowing machines performed satisfactory (82.3% ≤ QFI ≤ 90.4%).

Table 2. An achieved QFI pertaining to the spacing when sowing at a working speed $v = 6$ km h^{-1}

Tablica 2. Ostvareni QFI razmaka pri brzini rada od v = 6 km h^{-1}

Year / *Godina*	Location / *Lokacija*	Sowing machine / *Sijaćica S1*				Sowing machine / *Sijaćica S2*			
		H_1	H_2	H_3	H1-H3	H_1	H_2	H_3	H1-H3
2021	L1	89.69	90.47	89.75	89.97	89.93	90.10	90.67	90.23
2022		88.63	87.19	86.90	87.57	89.30	91.28	88.57	89.72
2021	L2	92.07	91.92	91.56	91.85	92.22	91.05	90.70	91.32
2022		90.17	90.02	91.12	90.44	90.47	90.66	91.87	91.00

The sowing machine S1 was set to sow a theoretical set of 72 474 plants ha^{-1} (19,59 cm of an intrarow distance), and the sowing machine S2 to 73 505 plants ha^{-1} (38,63 cm of an intrarow distance). A maize-sowing density also affects the yield and quality of maize grains. It is generally believed that a low planting density leads to a reduction in dry-matter accumulation per unit area, which in turn reduces the yield and the agronomic traits of maize (Dai et al. 2015).

Table 3. An analysis of variance for the specified research property - number of plants

Tablica 3. Analiza varijance za određena svojstva istraživanja - sklop biljaka

ANOVA - Number of plants / *Sklop biljaka* (plants ha^{-1})				
Factor / *Čimbenik*	L1		L2	
	F	p	F	p
Year / *Godina* (A)	$6.293\times10^{-4 n.s.}$	0.980	$1.631^{n.s.}$	0.206
Pattern / *Sjetva* (B)	5.211^{*}	0.025	8.759^{**}	0.004
Hybrids / *Hibridi* (C)	3.945^{*}	0.024	3.467^{*}	0.037

From the analysis of variance (Table 3), it can be seen that a sowing method (B) and hybrid (C) statisticaly significantly affected the realization of crop stand (i. e., the number of plants on m^2) in both research years. It is also evident that the year of research on both locations had no influence on the realization of the number of plants ha^{-1}. The average values of the determined number of plants of hybrids are figured in Table 4. It can be seen that a slightly smaller number of plants per hectare was recorded with a SR sowing on the locations L1 and L2 in both research years. The largest and the smallest difference in the number of plants was determined in 2021 on the location L1 and amounted to 2,899 and 1,183 plants, respectively. On the location L2 , the differences in the number of plants fluctuated between 1,511 and 1,644 in a TR sowing. Beres et al. (2008) reported significantly lower losses (by 13 %) in the number of plants from sowing to harvest in the narrow rows if compared to a standard sowing. Therefore, a sowing density should be reasonably selected according to a maize-hybrid properties and agroecological conditions.

Table 4. The average number of plants ha^{-1} on locations per hybrids and years of research

Tablica 3. Prosječan sklop biljaka ha^{-1} na lokacijama prema hibridu i godini istraživanja

Hybrid/ *Hibrid*	L1				L2			
	2021		2022		2021		2022	
	SR	TR	SR	TR	SR	TR	SR	TR
H1	59285^{b*}	61770^{a}	59108^{a}	60705^{a}	62658^{a}	62125^{a}	63368^{a}	64610^{a}
H2	60528^{a}	62125^{a}	61948^{a}	63190^{a}	62303^{a}	63900^{a}	60528^{a}	63332^{a}
H3	60350^{b}	64965^{a}	61060^{a}	61770^{a}	59722^{b}	63190^{a}	64078^{a}	64965^{a}
	60468^{B}	62243^{A}	60912^{A}	61829^{A}	61458^{B}	63486^{A}	62450^{A}	64066^{A}

*The pairs of sowing treatment's means were compared by Duncan's Multiple Range Test and labeled by the same letter, if not significant at the P < 0,05 significance level.

Table 5. An analysis of variance for the specified research properties – grain yield (14% moisture; kg ha^{-1})
Tablica 5. Analiza varijance za određeno svojstvo istraživanja – prinos zrna (14% vlage; kg ha^{-1})

Factor	Location / *Lokacija* L1		Location / *Lokacija* L2		Location / *Lokacija* L1+L2	
	F	p	F	p	F	P
A	410.600*	0,001	466.532*	<,001	875.800*	< .001
B	11.531*	0.001	25.472*	<,001	17.096*	< .001
C	0.906$^{n.s.}$	0.409	7.855*	<,001	17.462*	< .001
A*C	17.719*	0,001	21.191*	<,001	11.286*	< .001
B*C	0.854$^{n.s.}$	0.430	3.512*	0,035	0,320$^{n.s.}$	0,727

A = year, B = pattern, C = hybrids

By an analysis of variance, it can be seen from Table 5 that there were statistically high significances between the grain yield per locations. In contrast to the location L2, it was determined that the hybrids, as well as a sowing-method (B) and hybrid interaction (C), did not have a statistically significant effect on the yield on the location L1. A grain yield (kg ha^{-1}) achieved on both locations, depending on the hybrid and on the method of sowing, is figured in Table 6. In the 2021, no statistically significant differences in grain yield kg ha^{-1} were recorded between the sowing systems on the location L1 while using Duncan's Multiple Range Test. However, in 2022, it was statistically confirmed that sowing in the twin rows produced a higher grain yield both on the locations L1 and L2. The largest difference in yield was recorded on the L2 site, in the research year 2022.

Table 6. The average values of grain yield (14% moisture; kg ha^{-1})
Tablica 6. Prosječne vrijednosti prinosa zrna (14 % vlage; kg ha^{-1})

Hybrid/ *Hibrid*	Location / *Lokacija* L1				Location / *Lokacija* L2			
	2021		2022		2021		2022	
	SR	TR	SR	TR	SR	TR	SR	TR
H1	13454^{a}	13519^{a}	10305^{b}	10957^{a}	13857^{a}	14125^{a}	9934^{b}	10564^{a}
H2	14025^{a}	13879^{a}	10512^{b}	11171^{a}	14030^{a}	14239^{a}	11161^{b}	12032^{a}
H3	13153^{b}	13733^{a}	11253^{a}	11667^{a}	13513^{b}	14133^{a}	11243^{b}	12569^{a}
	13523^{A}	13742^{A}	10828^{B}	11446^{A}	13625^{B}	14215^{A}	10979^{B}	11615^{A}

*The pairs of sowing treatment's means were compared by Duncan's Multiple Range Test and labeled by the same letter, if not significant at the P < 0,05 significance level.

A yield increase is also confirmed by other authors (Jurković et al. 2018; Ogrizović, 2015; Banaj et al. 2023; Tadić et al. 2017), but it is difficult to compare the achieved results, which were formed on a certain type of soil, with a different nutrient content, sowing method, and the like. A higher grain yield and a total dry-matter yield in the narrow rows were also recorded by Liang et al. (2020), but the effect also depended on the year and on the number of plants. Of course, local meteorological variables had also exerted an impact on the yield. In addition to the influence of climate and weather phenomena, there are physical characteristics of the soil, along with the tillage methods, that can significantly favor the crop to achieve different production potentials on a certain specific place (Steward et al. 2018).

Table 7. An analysis of variance for the specified research properties - grain mass per cob *(g cob^{-1})*
Tablica 7. Analiza varijance za određeno svojstvo istraživanja - masa zrna po klipu (g klip^{-1})

Factor	Location / *Lokacija* L1		Location / *Lokacija* L2	
	F	p	F	p
A	2316.406*	<.001	4088.778*	<.001
B	8.211*	0.005	32.541*	<,001
C	4.998*	0.009	86.351*	<.001
A*B	34.833*	<.001	5.886*	0.018
A*C	81.592*	<.001	135.867*	<.001
B*C	3.664*	0.031	33.221*	<.001

A = year, B = pattern, C = hybrids

Based on the values from Table 7 above, it is evident that a statistical significance of the tested factors (A = year, B = pattern, and C = hybrids) was established, as was their interaction with the achievement of grain mass per cob (g cob^{-1}). The highest recorded mass of grain per cob in the SR was achieved on location L1 in the growing year 2021, amounting to 225.47 grams. In the case of TR sowing, the highest mass of grain per cob was determined in the same vegetation year, but on the location L2, in the amount of 224.62 grams (Table 8). The share of grain per cob was directly related to the achieved yield and the number of plants ha^{-1}.

Table 8. The average results of grain mass per cob (g cob^{-1})

Tablica 8. Prosječni rezultati mase zrna po klipu (g klip^{-1})

Hybrid/ *Hibrid*	Location / *Lokacija* L1				Location / *Lokacija* L2			
	2021		2022		2021		2022	
	SR	TR	SR	TR	SR	TR	SR	TR
H1	226.84	218.94	174.37	180.51	221.27	227.37	157.11	163.66
H2	231.64	223.35	169.69	176.78	225.24	222.82	184.36	190.38
H3	217.92	211.50	184.25	188.67	226.19	223.67	175.62	193.47

CONCLUSIONS

Based on the results of a research conducted on two locations (Radnovac and Kujnik, respectively) in the period of two growing years (2021 and 2022, respectively), it can be determined that the sowing of maize in the narrow rows, sown by the MaterMacc Twin Row-2 sowing machine, achieved the statistically equal (L1 - year 2021) or higher yields of maize grains (L1 - year 2022 and L2 - years 2021 and 2022). Comparing the years of research, it is clearly seen that the years of production had a statistically significant influence on the yield of maize grains. By investigating the impact of hybrids sown in the narrow rows (H1, H2, and H3) on the yield, it can be concluded that the statistically significant differences were obtained between the H1 and the other two hybrids, if compared to a standard sowing. The layout of seeds when sowing in the twin rows (a zigzag pattern) was more favorable to the hybrids of a longer maturity group, due to a lesser competition for environmental resources, especially for the availability of light and water during the early stages of hybrid growth and development.

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UTJECAJ SUSTAVA SJETVE NA PRINOS ZRNA KUKURUZA

SAŽETAK

Istraživanje dvaju načina sjetve kukuruza obavljeno je na lokaciji Radnovac (L1) i lokaciji Kujnik (L2) tijekom vegetacijske 2021. i 2022. godinje. Oba načina sjetve obavljena su podtlačnim pneumatskim sijaćicama: standardna sjetva (SR) na međuredni razmak od 70 cm sijaćicom PSK4 (S1), a sjetva u udvojene redove (TR) sijaćicom MaterMacc Twin Row 2 (S2) s razmakom od 22 cm, odnosno od 48 cm između dvaju susjednih redova. Zasijana su tri različita hibrida kukuruza različitih vegetacijskih grupa zrenja. Brzina sjetve iznosila je 6.0 km h^{-1}. Najveća i najmanja razlika u sklopu biljaka utvrđena je u 2021. godini na lokacija L1 i iznosila je 2899 i 1183 biljke ha-1. Na lokalitetu L2 razlike sklopa bile su između 1511 i 1644 u TR sjetvi. U 2021. godini na lokaciji L1 nisu zabilježene statistički značajne razlike u prinosu zrna kg ha^{-1} između dvaju sustava sjetve. Međutim, u 2022. godini i na obje lokacije, L1 i L2, statistički je potvrđen veći prinos zrna u udvojenim redovima. Najveća razlika u prinosu zabilježena je na lokaciji L2 u 2022. godini.

Ključne riječi: hibrid, kukuruz, prinos, sjetva u udvojene redove, standardna sjetva

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