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Nastavljajući dugogodišnju tradiciju, časopis ″Traktori i pogonske mašine″ i ovog puta svoje stranice posvećuje naučnom skupu

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koji se po dvadesetiprvi put održava u Novom Sadu na Poljoprivrednom fakultetu, dana 05.12.2014. godine.

U časopisu su objavljeni radovi koji prikazuju trend razvoja i korišćenja savremenih traktora, mobilnih sistema i ostalih sredstava mehanizacije u poljoprivredi.

Zbog povećanog interesovanja za alternativne i obnovljive izvore energije, u časopisu je objavljen veći broj radova iz ove oblasti. Posebna pažnja posvećena je informisanju čitalaca u vezi proizvodnje i korišćenja biodizela.

S obzirom, da se Skup održava pod svetlom aktuelne finansijske krize, poseban osvrt će se posvetiti uštedi u poljoprivrednoj proizvodnji, pre svega pri primeni poljoprivredne mehanizacije.

Uredništvo.

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Scientific paper

EFFECT OF EXTREME SITE-SPECIFIFIC VALUE YIELD AT THE DESCRIPTIVE STATISTICAL INDICATORS

UTICAJ EKSTREMNIH VREDNOSTI LOKACIJSKI SPECIFIČNOG PRINOSA NA OPISNE STATISTIČKE POKAZATELJE

Simonović V, Marković D., Jelena Ilić, Ivana Marković[1]

SUMMARY

In this paper, the normality of the distribution was observed yield triticale using skewness and kurtosis. Based on the 7376 location-specific samples in a field of PKB was observed that the distribution of returns is not normal. Skewness (3.615) suggested that the right slant, and the kurtosis (97.739) was very high. However, the measurement are very extreme values of return, and is approached examination of their impact on distribution. It was concluded that after the removal of these two the extremely value distribution becomes symmetrical, and leptokurtosis significantly milder (coefficient of -0232 or 7.294).

Key words: site-specific yield, tritical.

REZIME

U ovom radu opservirana je normalnost raspodele prinosa tritikala pomoću asimetričnosti i spljoštenosti. Na osnovu 7376 lokacijski specifičnih uzoraka na jednom polju PKB uočeno je da raspodela prinosa nije normalna. Koeficijent asimetrije (3.615) sugerisao je desnu iskošenost, a koeficijent spljoštenosti (97.739) je bio veoma visok. Međutim, izmerene su i izrazito ekstremne vrednosti prinosa, pa se pristupilo ispitivanju njihovog uticaja na raspodelu. Zaključeno je da se nakon uklanjanja ove dve ekstrmne vrednosti raspodela postaje simetrična, a spljoštenost značajno blaža (vrednosti koeficijenta -0.232 odnosno 7.294).

Ključne reči: lokacijski specifični prinos, tritikal.

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INTRODUCTION

Many statistical techniques are based on the assumption that the distribution of the results of the dependent variable is normal. Normal distribution is symmetric, bell-shaped curve with the highest results in the middle and a smaller number of results towards the ends (tails) tone. Normal distribution around the value of measurement illustrates the graph in Figure 1 Normal distribution depends precisely on the above defined $\overline{X}$ mean values and standard deviation σ. For larger values of σ the normal curve that is more stretched. If the mass yield as a variable is

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normally distributed, then it is true that 68.2% of the interval $\bar{X} \pm 1\sigma$, 95.4% of the value is within the interval $\bar{X} \pm 2\sigma$, 99,7% 99.7% of the value is within the interval $\bar{X} \pm 3\sigma$. The normal curve extends from -∞ to + ∞ and symmetrical or 50% of the value is left, 50% of the value to the right of the mean $\bar{X}$.

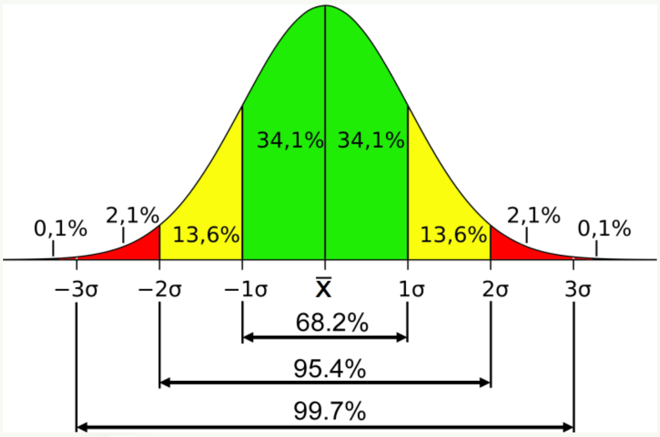

Fig.1. Normal distribution

Normality can be assessed to some extent on the basis of the calculated values of skewness and kurtosis. Positive asymmetric distribution characterized by a positive coefficient, and the right tail, and most cases of left or right slant. Negative asymmetric distribution is characterized by a negative coefficient, the left tail and the majority of cases, the right or left slant. According to Garson [1], distribution is normal if the attenuation coefficient in the interval [-2, +2], although some authors use the more stringent requirement that short interval [-1, +1]. Also according to Garson, a normal distribution is characterized by the kurtosis in the interval [-2, +2] (some authors use the milder criterion [-3, +3] and other authors stricter criterion [-1, +1]). A negative value means kurtosis increasing number of cases in the tails of the distribution curve and flattened distribution. Positive kurtosis means pointy distribution and the steep curve of distribution. In this paper we analyzed and evaluated the normality of the distribution of the mass yield of dry grain in five different cultures in five different fields which are the object of research, and that the same yield will be further analyzed in the following sections. The aim of the assessment of normality to determine whether the distribution of the mass yield of dry grain normal. In this case, you can use parametric methods for the analysis of data obtained by monitoring the yield if the subsequent confirmation yet assumptions of linearity and homogeneity. Otherwise, analyze will be made solely by nonparametric statistical techniques to investigate the links between the variables. Requests for non-parametric techniques are not so strict and nothing is assumed about the appurtenant distribution of the population. That's why they are called distribution-free test.

MATERIAL AND METHODS

Combine harvesting that was used in this study was equipped with Heather width of 6 m. Sensor for measuring the mass flow of grain set on top of the clean grain elevator, a sensor for measuring the moisture content is placed in the middle of the clean grain elevator, Figure 2 mass sensor measures the impact force exerted by the dumped grain elevators with blades falling on the impact plate. On the basis of this force, as well known to the width of the developer, the speed of movement and the speed of the elevator to the grain, as well as the percent of moisture, calculated on the weight of dry yield of grain. The effect of vibration harvester was eliminated the previous calibration mass sensor[2]. It is also pre-calibrated sensor and moisture content.

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Fig. 2. a- Gape between elevator and auger for clear grain and impact plate of mass flow sensor with modul (view from grain tank) and b - grain moisture sensor

System for the measurement of the yield is configured to successively records data on every two seconds. This is the time interval measurement, which was constant. Changing only the distance traveled during this time which is dependent on the speed of the combine and also was scored for each time interval of two seconds. If the recording interval in the range of 1-3 s, generate very large data sets, even for small fields [3].

The system for measuring grain yield is adjusted to successively record data at 2-second intervals. This was a constant time interval of measuring. The only parameter that changed was the distance travelled during that time, depending on the combine speed and was also recorded at 2-second intervals. The recording of measurements at 1-3 second intervals generates large datasets, even for small fields [3].

Early studies focused on minimising the travel time delay between the crop being cut and measured at the yield monitor. Time offsets have been applied so that measurements at the monitor match the actual harvest position. Actual delay times vary between the make and model of harvester, yield monitor and GPS receiver [4,5,6] and within fields due to crop conditions [5]. Data time shift used in this paper amounted to 10 seconds. Various factors such as combine separator design and settings and monitoring systems can affect the data gathering process so that the time shift should be adjusted. Without this adjustment, the grain flow and moisture values cannot be properly coordinated with location and area information to deliver data that accurately represents that location [7].

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RESULTS AND DISCUSSION

Followed by presentation of the results of the assessment of the normality of the distribution of the mass yield of dry grain triticale on the Tablets of 40, holding "Padinska scaffold", based on 7376 measurements, Figure 3.

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Table 1 shows the descriptive indicators and other information about the analyzed mass yield of dry grain triticale. The initial mean (4.71529) and a new mean value (4.71888), which is obtained by neglecting the upper and lower 5% of the cases indicate that extreme values do not affect the mean. However, the table of extreme values and the diagram of a rectangle (Figure 7) observed the two extreme points which are separated from the rest of the points. These are the results of measuring the number of the 1227 and 6173 (Table 3). It is the impact of these two measurement results is crucial for the extremely high value of skewness (3615) suggests that the right slant and especially for the high value of kurtosis (97 739), which suggests a very pointed distribution. This was also evident in the histogram distribution of the mass yield of dry grain triticale shown in Figure 4 Two extreme outliers are also visible on the curve of normal probability QQ diagram for the mass yield of dry grain triticale (Figure 5), and the curve deviation from the normal distribution of mass yield of dry grain triticale (Figure 6).

Fig. 3. Representation of site-specific dry grain yield, tons per hectare

Tab. 1. Description statistics for dry grain triticale yield mass

			Statistic	Std. Error
Yld Mass(Dry)	Mean		4.71529	.008284
	95% Confidence Interval for Mean	Lower Bound	4.69905	
		Upper Bound	4.73153	
	5% Trimmed Mean		4.71888	
	Median		4.72800	
	Variance		.506	
	Std. Deviation		.711453	
	Minimum		.388	
	Maximum		23.260	
	Range		22.872	
	Interquartile Range		.755	
	Skewness		3.615	.029
	Kurtosis		97.739	.057

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Tab.2. Extreme values of the mass yield of dry grain triticale

			Case Number	Obj. Id	Value
Yld Mass(Dry)	Highest	1	1227	1227	23.260
		2	6173	6173	20.240
		3	5541	5541	9.393
		4	2396	2396	9.386
		5	5021	5021	9.303
	Lowest	1	4656	4656	.388
		2	7214	7214	.523
		3	4455	4455	.539
		4	4946	4946	.604
		5	4657	4657	.684

Tab. 3. Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Yld Mass(Dry)	.064	7376	.000

a. Lilliefors Significance Correction

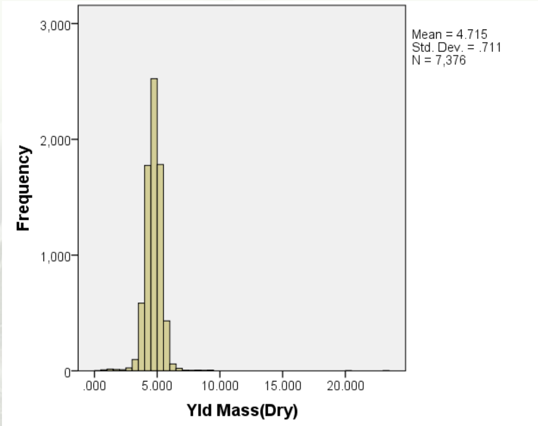

Fig.4. Histogram of yield mass dry grain

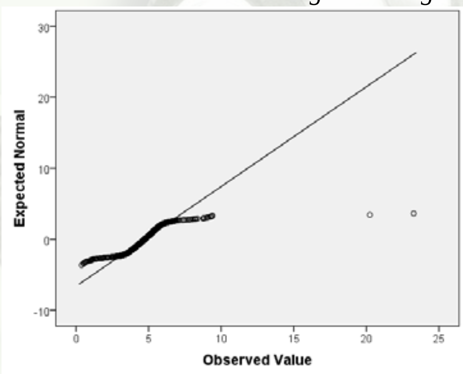

Fig.5. Normal Q-Q Plot of yield mass dry grain

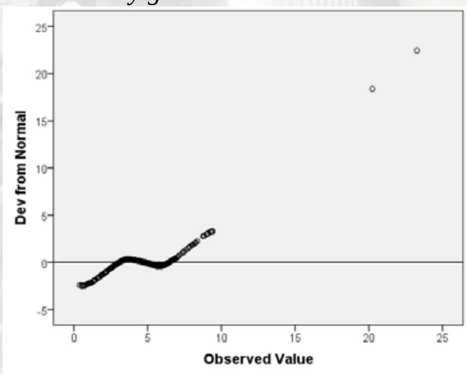

Fig.6. Detrended Normal Q-Q Plot of yield mass dry grain

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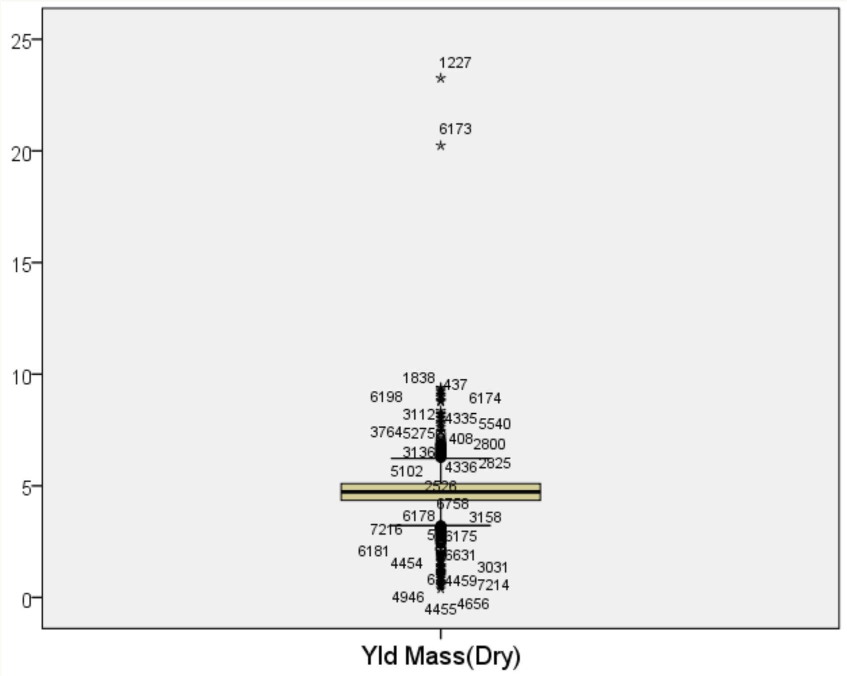

Fig.7. Boxplot diagram of yield mass dry grain

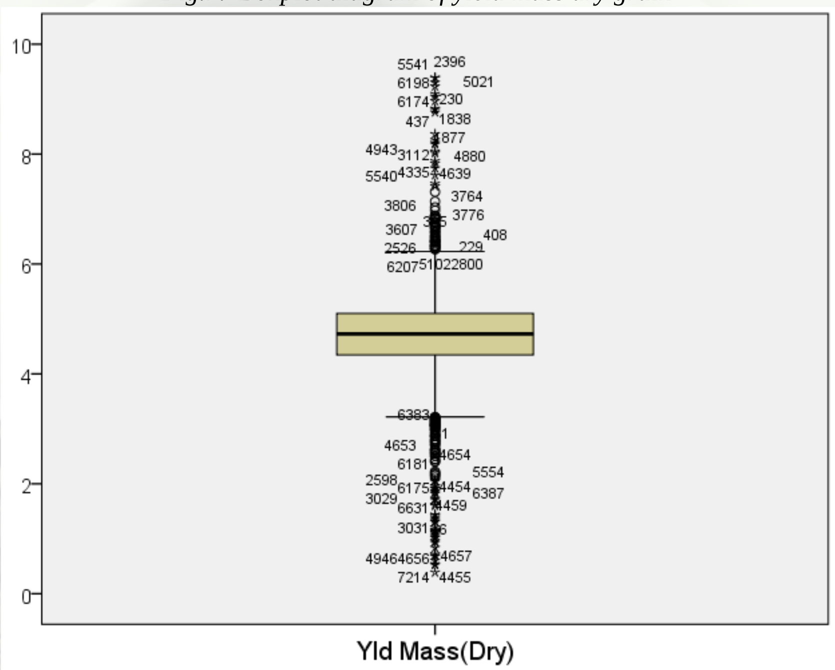

Fig.8. Boxplot diagram of yield mass dry grain without points No. 1227 and 6173

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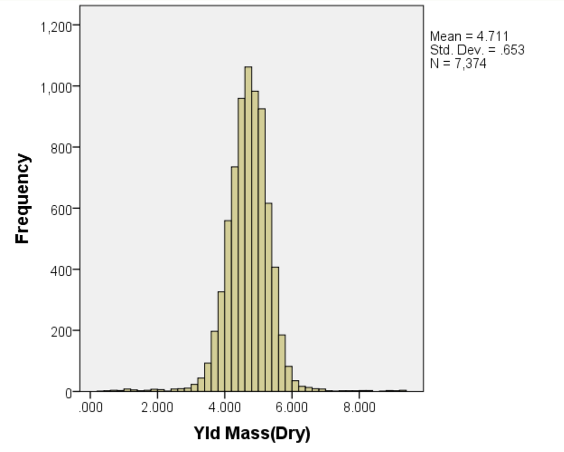

Fig.9. Histogram of yield mass dry grain without points No. 1227 and 6173

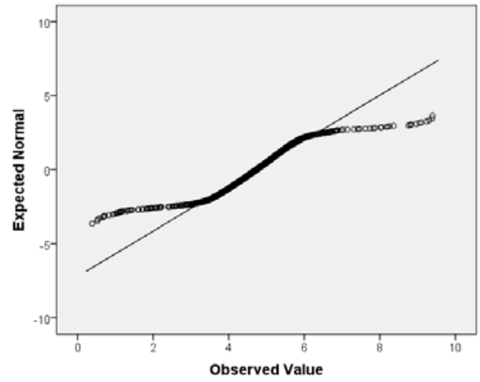

Fig.10. Normal Q-Q Plot of yield mass dry grain without points No. 1227 and 6173

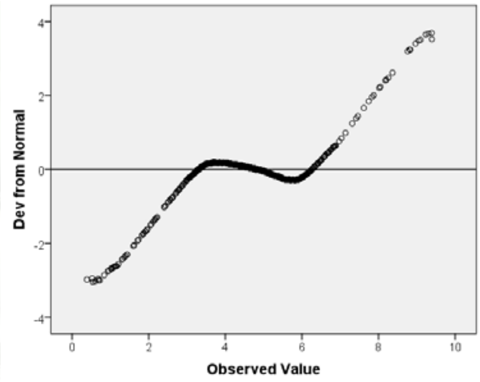

Fig.11. Detrended Normal Q-Q Plot of yield mass dry grain without points No. 1227 and 6173

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In case of rejection of the aforementioned two extreme values, we can form a new box plot diagram, Figure 8. The new mean value does not change significantly (4.71067), but the asymmetry and kurtosis acquire substantially lower values (-0232 or 7.294) and the distribution becomes slightly asymmetric in right and less elongated. Histograms (Figure 9), Q-Q diagram (Figure 10) and diagrams of deviation from the normal distribution (Figure 11) are also changed. Mass yield of dry grain triticale, but this change still does not affect the conclusion of the normal distribution. Specifically, Table 3 presents the results of tests of normality of distribution expressed by the Kolmogorov and Smirnov for all 7376 measurement results. Normality found to be statistically insignificant (random) deviation from normality, ie. amount Sig. greater than 0.05. In this case, Sig. is 0.000, which indicates that the assumption of a normal distribution must be rejected.

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CONLUSION

Analysis of the results of measurements of mass yield of triticale on this plot indicated the great importance of extreme value in assessing the normal distribution and the large differences in the descriptive statistical parameters which evaluates the normality. Therefore, when measuring the mass flow rate during the harvest necessary to eliminate all possible sources that affect the occurrence of extreme values of the measured flow and consequently yield. Before the start of the harvest is necessary to make a correct and optimal calibration for the given conditions in the field. During harvest, it is necessary to continuously operate the combine without abrupt changes in particular those that cause shock and vibration. After harvest, if the occurrence of an extreme value in the site-specific information about the yield, it is necessary to carry out filtering of data.

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