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FORECAST AGRICULTURAL CROP YIELDS USING DYNAMIC SERIES

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Abstract
In this article, when teaching students the topic of predicting yields using dynamic series of mathematics, the support of theoretical data directly on the solution of Agricultural Issues is studied using pedagogical experiments, which leads students to better master science, strengthen their professional training.

Keywords: experiment, soil fertility, yield, random factors, timed(dynamic) series, statistical analysis, statistical hypotheses, random process, trend, autocorrelation coefficient, interval statistical assessment, linear linkage, least squares method, correlation linkage.

Introduction

The use of the younger generation with economic knowledge and its use in its activities leads to the development of the economy of our country, an increase in labor productivity, an improvement in the quality of the product being produced, a decrease in the cost of products, an increase in production efficiency. At the moment, economic knowledge forms at every age the misrepresentation that our country is the owner, the conscious attitude to work, active, disciplined and Organizational in life.

The study of the basics of Science provides a great opportunity for the sequential and systematic formation of economic knowledge.

In the acquisition of economic knowledge, in solving its problems, mathematics in particular has a great role. Usually in economic accounting, the fact that mathematics is in the main places is manifested in solving specific issues. Possible positions also shift from"abstract mathematics "to"concrete mathematics " to economic issues. In this case, it is important to build mathematical models of economic problems. In many cases, mathematical models of economic problems are expressed through functions, equations.

It is known that the yield of agricultural crops is a complex random process, which depends on the quality of the seed, soil fertility, applied fertilizers, agrotechnical measures, weather and many other random factors.

Tajirba, based on the analysis of the results of research, the methods of Mathematical Statistics play an important role in making guaranteed scientific conclusions. There is a lot of scientific and practical literature devoted to this area [1]- [4].

The fact that the process of growing agricultural crops is repeated seasonally over a certain period of time forms the basis for our analysis of it as a discrete $\{Y_t, t \in T\}$ random-time(dynamic) series.

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In this article, a statistical analysis of the yield of agricultural crops grown in the Republic in 2009-2023 as $\{Y_t, t \in T\}$, a stationary time series, on which point, interval estimates were built and various statistical hypotheses were investigated.

The main organizers of the time series $\{Y_t, t \in T\}$ can be: 1) the trend indicating the main direction, 2) the part oscillating around the trend, 3) the seasonal influencer, 4) the random part In the Republic, based on the geometric interpretation in $\{Y_t, t \in T\}$, Descartes coordinate system of cotton, wheat, vegetables, potatoes, grapes grown in 2009-2023, we can take it as having a roughly linear connection. By evaluating the unknown parameters involved in the linear connection with the method of the smallest squares, the statistics neck, we get the following equations(Table-1):

Table-1

№	Types of agricultural crops	Equations relating productivity to time
1.	Cotton	$Y(t)$=20.344+0.056t
2.	Wheat	$Y(t)$=31.208+1.536t
3.	Corn	$Y(t)$=24.944+0.998t
4.	Potato	$Y(t)$=61.108+0.676t
5.	Vegetable	$Y(t)$=169.592+5.625t
6.	Vintage	$Y(t)$=42.804+2.068t

Important unknown parameters of the studied dynamic series with finite subtractions and sliding mean-value methods, statistical data are analyzed and point and interval statistical estimates are built on them with a 95% guarantee (Table-2, due to limited capacity, we cannot cite complete calculations, formulas).

Table-2

Sampling characteristics	Cotton	Vintage	Vegetable	Potato	Wheat
Sample mean $\overline{y}_T$ s/ga	20,344	42,125	169,592	61,108	31.208
Sample mean quadratic deviation σ_T	3, 740	16, 505	44,371	11,249	12,167
Variation coefficient v (%)	18,384	39,181	39,421	18,408	38,981
Asymmetry A_ς	-1,2638	-0,409	-0,179	-0,294	-0,397
Exessa Ye	1,1188	-1,437	-1,169	1,407	-1,282
Of the sample mean $\bar{X}_T$ error m_x	$m_x = \frac{\sigma_x}{\sqrt{n}}$= = 0,7798	$m_x = \frac{\sigma_x}{\sqrt{n}}$= 3,369	$m_x = \frac{\sigma_x}{\sqrt{n}}$=8,874	$m_x = \frac{\sigma_x}{\sqrt{n}}$= 2,249	2,433
Limit error m'_x	$m'_x = tm_x$= 0,7798· 2,06 = = 1,606	$m'_x = tm_x$= 3,369· 2,06 = 6,940	$m'_x = tm_x$= 2,06· 8,874 = 18,28	$m'_x = tm_x$= 2,249· ,06 == 4,633	$m'_x = tm_x$= 2,433· 2,06 = 5,013
Error of mean quadratic deviation m_σ	$m_\sigma = \frac{\sigma}{\sqrt{2n}}$= = $\frac{3,74}{7,071}$ = 0,5289	$m_\sigma = \frac{\sigma}{\sqrt{2n}}$=$\frac{16,505}{6,928}$= =2,382	$m_\sigma = \frac{\sigma}{\sqrt{2n}}$=$\frac{44,371}{7,05}$= =6,294	$m_\sigma = \frac{\sigma}{\sqrt{2n}}$=$\frac{11,249}{7,071}$= =1,591	$m_\sigma = \frac{\sigma}{\sqrt{2n}}$= $\frac{12,167}{7,071}$= =1,721

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Variation coefficient error (%)m_v	$m_v = \frac{v}{\sqrt{2n}}\sqrt{1+(\frac{v}{100})^2}=$ = 2,6435	$m_v = \frac{v}{\sqrt{2n}}\sqrt{1+(\frac{v}{100})^2}$=6,079	$m_v = \frac{v}{\sqrt{2n}}\sqrt{1+(\frac{v}{100})^2}$ =6,76	$m_v = \frac{v}{\sqrt{2n}}\sqrt{1+(\frac{v}{100})^2}$ = 2,647	$m_v = \frac{v}{\sqrt{2n}}\sqrt{1+(\frac{v}{100})^2}=$ = 1,847
Interval statistical evaluation (95% li) $\bar{X}_T \pm tm_x$	$\bar{X}_T \pm tm_x$= 20,344 ± 1,606 (18, 738 ; 21,95) s/ga	$\bar{X}_T \pm tm_x$= 42,125±6,94 (35,185 ; 49,06)s/ga	$\bar{X}_T \pm tm_x$= 169,59 ±18,2 (151,31; 87,87) s/ga	$\bar{X}_T \pm tm_x$= 61,11±4,31 (57,0 ;65,42) s/ga	$\bar{X}_T \pm tm_x$= 31,208±5,01 (26,19 ;36,21) s/ga
Jak-Berra, Shapiro-Vilkokson kriteriyalari $H_0 : P(X < x)= F_{a,\sigma}(x)$	95% Lee guaranteed H_0 *hypothesis* accepted	95% Lee guaranteed H_0 *hypothesis* accepted	95% Lee guaranteed H_0 *hypothesis* accepted	95% Lee guaranteed H_0 *hypothesis* accepted	95% Lee guaranteed H_0 *hypothesis* accepted

The autocorrelation coefficient is important in studying the properties of the time series. L is the coefficients of autocorrelation using the following formula,absorbing Time per year (called L-lag):

$$R_L = \frac{\sum_{t=1}^{N-L} Y_t Y_{t+L} - \frac{\sum_{t=1}^{N-L} Y_t \sum_{t=L+1}^{N} Y_t}{N-L}}{\sqrt{\left[\sum_{t=1}^{N-L} Y_t^2 - \frac{\left(\sum_{t=1}^{N-L} Y_t\right)^2}{N-L}\right]\left[\sum_{t=L+1}^{N} Y_t^2 - \frac{\left(\sum_{t=L+1}^{N} Y_t\right)^2}{N-L}\right]}}$$

L=1,2,3,... by calculating the values of RL in the values $Y_1, Y_2 \ldots Y_{T-1}$ and $Y_2, Y_3, \ldots, Y_T$ it was found that there is a correlation bond between random quantities(R_1, R_2 ... R_5 prices are non-zero). On the second hand, computations with the Darbin-Watson criterion show,

$$d_{kuz} = \sum_{t=1}^{T-1} (Y_{t+1} - Y_t)^2 / \sum_{t=1}^{T} Y_t^2.$$

all d_{kuz}- values, from the special Table[1], [3] found d_krit=1.08 less than the critical value $d_{kuz} < d_{krit}$. Hence, all studied random quantities have an autocorrelation, $y_t = \rho y_{t-1} + \varepsilon_t$, ρ=SOV(u_t,u_{t+1}) bond. That is, it turns out that the yield from cotton, wheat, vegetables, potatoes, grapes in the Economic year depends on the yield of the previous year.

Ma'lumki, qishloq xo'jalik ekinlarining o'rtacha hosildorligi $\overline{y(t)}$aksariyat holda, normal taqsimotga ega bo'ladi, chunki barcha qishloq xo'jalik ekinlari diyarli bir xil sharoitda, bir xil qalinlikda, katta maydonlarda o'stiriladi. Bu tasodifiy miqdorlarni o'rtacha hosildorlik-larini normal taqsimlangan tasodifiy miqdor;- degan asosiy H_0statistik gipotezalar, parametrik hamda Pirson, Jak-Berra kriteriyalari yordamida, 95% kafolat bilan qabul qilinadi. Bu muhim tasdiqqa asosan, qishloq xo'jalik ekinlarini haqiqiy hosildorligiga(a –matematik kutilishiga) kafolatli intervalli statistik baholar qurilgan(jadval-2 ga qarang).

It is known that the average yield $\overline{y(t)}$ of agricultural crops, in most cases, will have a normal distribution, since all agricultural crops are grown under the same conditions, with the same thickness, on large areas. It is a random quantity whose mean yields are normally distributed; the basic H_0 statistic hypotheses, parametric as well as Pearson, using Jacques-Berra criteria, are taken with a 95% guarantee. Based on this important confirmation, statistical estimates with a guaranteed interval to the actual yield(a-mathematical expectation) of agricultural crops are built(see Table-2).

Conclusions and suggestions

Based on a statistical analysis of the yield of agricultural crops grown in the Republic as a time series, the following conclusions can be drawn:

1) the cultivation of cotton, wheat, vegetables, potatoes, grapes in the Republic is a process that depends on random factors;

2) the production of cotton, wheat, vegetables, potatoes, grapes characterizes the main direction of the processchitrend part has a linear connection;

3) the yield of agricultural crops grown annually in the Republic has an autocorrelation link $y_t = \rho y_{t-1} + \varepsilon_t$.

References

1. B. A. Dospexov «Metodika polevogo opыta». «Agropromizdat»,1985y,352str.
2. B. Abdalimov, A.A.Fayziev, L. Rajabova «Prognozirovanie urajaynosti selskoxozyaystvennых kultur”. Obedenyonnыy nauchnыy jurnal, Moskva №2, 2013g, Str.43 4.
3. K.D.Lyuis “Metodы prognozirovaniya ekonomicheskix pokazateley” M.”FiS”,1986.134 str.

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