

## Abstract of the Article

### "Research of Displays of Chaotic Dynamics in Grain Production of Ukraine" by P. Hrytsiuk

The aim of the work is to define the features of chaotic dynamics in changes of winter wheat yield. The yield series for the regions of Ukraine for the period from 1955 – 2008 years served as basic data. In order to bring the series to stationary form the author created a harmonic trend. The research of surplus behaviour made it possible to define their cyclicity (the duration of periods is 4 and 16 – 18 years). It is evidence of mainly determinate character of grain production system. To do our research we selected 16 regions of Central and Eastern Ukraine which had the most apparent cyclicity effect. Close values of cycle's periods allow considering these regions an unified statistic ensemble. According to ergodic principle such series of 16 time periods each of which is 54 elements long can be considered an analogue of one time period which is 832 elements long.

In order to filter high-frequency noises the author used the convolution with Gaussian kernel and Fourier's discrete conversion. When defining the distance between vectors the pairs of vectors, situated in different columns of yield matrix were considered. The method of "false neighbours" was used in order to define the volume of investments and the evaluation  $D = 4 \div 6$  was received. The procedure of Grassberger–Procacci was used to define correlation dimension. As a result the evaluation  $d_c = 4.30 \pm 0.06$  was received. The calculation of Lyapunov's index was made with the help of Wolf's method. The evaluation  $L_1 = 0.038$  was received after computer calculations. The additional index value defines chaotic dynamics and allows evaluating maximum horizon of yield forecast for 25 years.

High values of correlation dimension and close to zero value  $L_1$  does not allow to make an unambiguous conclusion of the presence of chaotic dynamics in the system. Therefore the matter of the character of yield dynamics of winter wheat (ordinary or chaotic) needs additional research.