

RESEARCH ARTICLE

CROP FORMATION RESEARCH IN UKRAINE USING SCIENTIFIC APPROACH

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Abstract

The article is about the results of the crop formation research in a wheat field obtained by SRCAA "Zond" after the expedition in the village Kordyshivka in Vinnitsa region, Ukraine in June 2011.

Were found that plants bending are the result of changing the direction of growth in nodes caused by the influence of an unknown phenomenon at the cellular level, and also the soil chemical composition has changed.

Keywords: crop formation, plant abnormalities, physical changes, scientific approach, Ukraine

Introduction

Ukrainian Scientific-Research Centre for Analyses of Anomalies (SRCAA) „Zond” – the organization in a Kyiv Polytechnic Institute (Faculty of Aircraft and Space Systems) that provide a scientific study of anomalous phenomenon's in Ukraine since 2004. The main goal of SRCAA „Zond” is the systematization and analysis of a data about anomalous phenomenon's, their identification and estimation of their nature, establishing cooperation with related organizations in Ukraine and abroad.

An anomaly phenomenon as a mostly non-periodical, transient and unclearly localized in the environment leaves a little possibility for researchers in studying and hypotheses' developing. But the crop formations that appear in the plants fields since old times gives a chance of research because it show some regularity and residual material evidences. Anomalous effects in a crop formations exhibit same stable parameters in different places and at different times.

Recent research's on the fundamental characteristics of crop formations are devoted to modelling of effects that cause plants changing, the comparative analysis of their growth etc. (Talbot 1994, Levengood, 1999, Pringle 1999, Haselhoff, Boerman, Bobbink 2014).

Ukraine as an agricultural country has enough fields but up to this point the crop formations were reported too late or reports were non quality and the quantity of reports has not exceed 1-2 per year so no scientific studies were made. It seems that the main reasons for this is that: mostly flat area (well-known that hills and mountains make detection of crop formation simplest); a small development of agricultural and private aviation; most people are not informed about phenomena and not motivated to report; media in villages still locally isolated so researchers has low ability to monitor the appearance of messages.

Formations investigated SRCAA in Ukraine in the period since 2004 and until now, have been associated with changes of plants colour and direction of growth. It was the result of uneven reset fertilizers or modifications due to natural factors (Bilyk 2011). Fragmentary messages of the appearance of formations in the fields in which the stems of plants were bent, repeatedly came to Ukraine researchers but to late when the harvesting is over. Thus, when in June 2011 the SRCAA received information about the appearance the crop formation near the village Kordyshivka (Fig 1), it was the first opportunity to explore the phenomenon in Ukraine using scientific approach and with minimum delay in time.

Methods

Formations were registered by the local employees of the agricultural sector during the irrigation of the field in night on 18 June 2011. Actually the sufficient height of sprinkler-machine helped to identify formations that are being placed on the plain and impossible to visually identifiable it at a distance just 40 ... 60 m. It is difficult to recognize the date and time of formation appearing because the regular monitoring of this field is not made; formation located at a distance of about 300 m from the nearest settlement building and 100 meters far from the village road. Work group of four SRCAA experts - A. Bilyk, , A. Kirichenko, M. Mironov and S. Verhovynin investigated the anomaly 25 of June after information receiving from the local newspaper 22 of June.

Determined that the formation consist of eight circles with a diameter of 4 to 12 m (Figure 2,3) between the tracks for agricultural machinery. Seven circles plants were bent clockwise and in one - against it. Changing the direction of plant growth is 30^0 ... 60^0 and made in one or two nodes at a height above the ground about 40 cm. In a circle with the notched segment (Figure 2) plants bent clockwise and along the edge of a segment.



Fig. 1. Kordyshivka village on a map of Ukraine, and a place of crop formation appearance

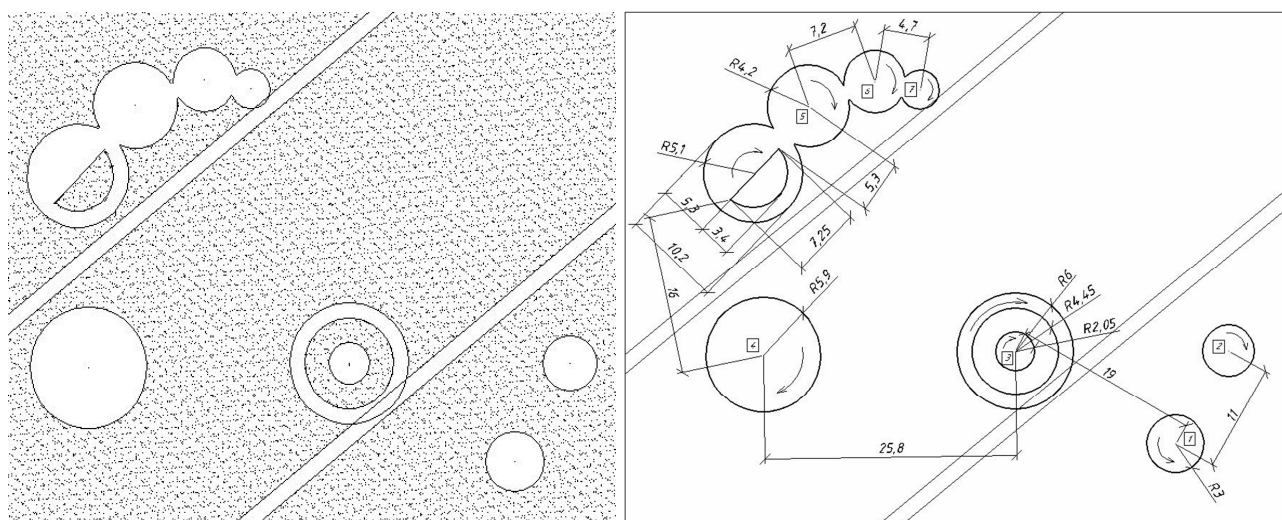


Fig. 2. The crop formation scheme after the geometrical measuring (meters, North above)



Fig. 3. The central circle and the part of crop formation



Fig. 4. The hole in a soil in a centre of some circles (bended plants around hole particularly damaged by humans)

It is significant that in the middle of seven circles was found a hole in the soil with a diameter of 2...2.5 cm with straight edges from which the soil has apparently removed (Figure 4). The initial holes depth was up to 25 cm according to witness evidences, measured in the SRCAA study – 15-17 cm. It should be noted that the plants and the holes at the time of the study were damaged due to uncontrolled visits of inhabitants and rainfall that were continuously in this region in June.

According to verbal witnesses who visited formations within the first day after the registration of crop formation, has the deteriorated psychophysiological state, denied mobile phones, discharged batteries. During the expedition such manifestations were not observed may be because of a week delay between crop formation appearance and investigation date. No any anomalous aerospace phenomena have been recorded in the investigated area during the last time, but it is cannot be excluded.

Measuring of electric field intensity of low (30 ... 300 Hz) and ultra-high frequency (50 MHz to 3.5 GHz) showed not significant deviations above zero. The level of gamma radiation on the formation has been 12..14 microroentgen per hour, which corresponds to the background parameters measured in the village Kordyshivka and near the field where anomalies were found.

Observation of local bio-detectors (swallows, ants) also does not show abnormal behaviour when it crossing formation borders. It should however be noted that after a week of rain residual effects could be neutralized. The search for metallic objects, particles using metal detector also shown no results. For the aerial photography has used the SRCAA radio-controlled helicopter model with the attached camera. But unfortunately due to a short circuit through the total rain it was lost control and burned, so the aerial

photography was not performed. For research during the expedition were taken experimental and control samples of plants and soil. The test samples were collected directly from the formations in a location not damaged by rain and people, and have change in the direction of growth in nods (Fig 5,6,7).



Fig. 5. The plants samples taken from formation with the growth direction change



Fig. 6. The cut nods of control wheat plants

Control wheat plants samples were taken from the same field at a distance of at least 100 meters from the formation. Control samples were not bringing in a formation. All samples had no any direct contact with human or materials, conservation were carried using hermetic clear plastic bags. The sufficient storage and transportation procedures were done.



Fig. 6. The cut nods of a wheat plants taken from crop formation

The samples of soil (loam) were taken from round and epicentres of circles (places of holes) from a depth of 5cm. Analysis of samples was carried out at the National Scientific Centre "Institute of Agriculture, National Academy of Agricultural Sciences of Ukraine" in the "Department of Agroecology and analytical research" using methods according to Ukrainian regulation ISO ISO10390: 1994 and IDT Soil quality.

Research results (Table 1) showed convergence in samples chemical composition for the presence of biogenic elements. This shows the same (and in the normal range) effect of fertilizers on a wheat plants, which could not lead to any bending modifications itself. At the same time the anomalous differences between firmly fixed forms of heavy metals - zinc, manganese and iron were obtained. Natural factors that could cause such differences within the same soil with sustained sampling method, according to the NSC "Institute of Agriculture NAAS" conclusion remain unknown.

Table 1. The results of chemical composition analysis of soil samples

Sample	The exchange acidity, pH	Organic substances, recalculated on humus, %	Common forms of biogenic elements, %				Firmly fixed forms of heavy metals and microelements, mg per kg of soil						
			N	P ₂ O ₅	K ₂ O	Na ₂ O	Cu	Zn	Pb	Cd	Ni	Mn	Fe
1c	4,7	1,40	0,06	0,02	0,68	0,10	10,0	36,7	78,3	12,5	90,8	158,3	9830,8
1f	4,9	1,56	0,05	0,01	0,65	0,09	10,0	20,8	78,3	14,2	97,5	258,3	5535,0

1c – integral control samples, 1f – integral formation samples

Anthropogenic factors such as deliberate contamination of surface excluded due to the depth of sampling and integral nature of the selection of the control sample. An anthropogenic factor such as intentional soil surface pollution also seems unknown due to the depth of sampling and integral nature of the control sample selection. This allows you to suggest hypothesis about the association between the anomalous soil chemical composition changing and the crop formation itself, although the mechanism of this association still uncertain.

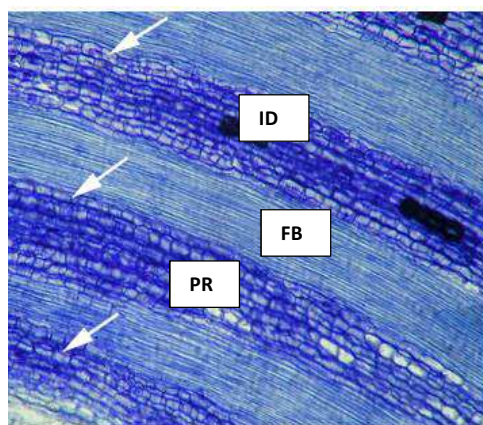
Wheat has a type "Master", the plants was twice treated against pests and regularly were sprinkled with water. Samples stems were provided for analysis to the National University of Life and Environmental Sciences (NULES), in to the Department of Ecobiotechnology and Biodiversity (Expert PhD, AssProf A. F. Likhanov). Visual inspection of plants showed anomalous change of wheat in the nodes, which cannot be result of a known viruses and pathological plants abnormalities. In addition, it known that a wheat type "Master" is one of the most resistant to extreme conditions.

As a result of morphological and anatomical studies of samples of wheat was found that the plants has the typical signs of straightening the stems after damage that is a characteristic feature for wheat. But the origin of formation samples bending according to research by NULES Department of Ecobiotechnology and Biodiversity could not be determined clearly. Mainly it because of the long time (one week) between the phenomenon acting to the wheat and sampling; also the test plants were under high anthropic load, which could lead to additional changing in organic matter. Below presented the main conclusions from the NULES scientific report.

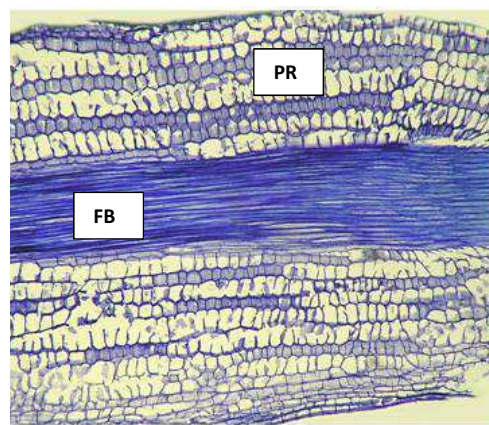
Anatomical analysis of the plants showed that the control samples in the area of wheat leaf collar zone main parenchyma cells unilaterally increased in the amount that may be due to hormonal stimulation meristematic tissues.

A characteristic feature for wheat plants is the presence of sclerenchyma strands, which in a leaf collar zone alternating with the layers of parenchyma and gradually transformed into lamellar collenchyma. In an collenchyma cells were marked the intrusive growth (growth among neighboring cells) and an insignificant thickening of cell membranes. Because of asymmetric division and tension of collenchyma and parenchyma cells, stem bends toward the opposite zone of maximum growth.

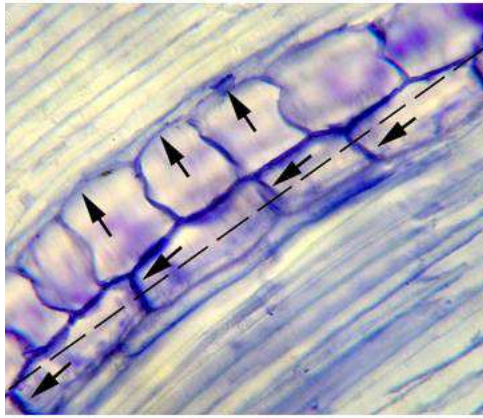
In the injured plants in the nodal parenchyma in the individual chlorenchyma cells and in the tracheids is accumulated some phenolic substances. The number of idioblasts (the cells with chemical composition which is very different from the others) is increased. The increased synthesis of secondary metabolites, including polyphenolic nature may be response of plants to the influence of some external negative factors with biogenic or abiogenic nature. In a control samples leaf collar zone has a typical structure for a wheat plants, parenchyma cells almost iso-diametrical, or has a slightly elongated periclinal walls. Idioblasts in control samples investigated were not found.



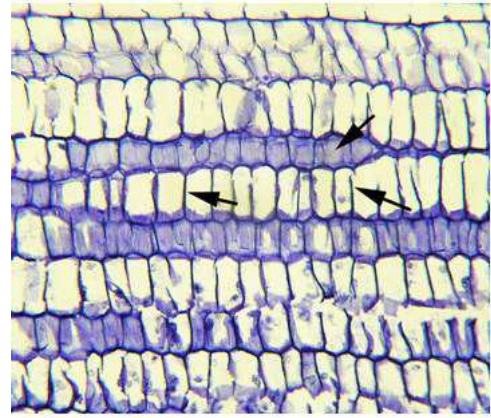
A



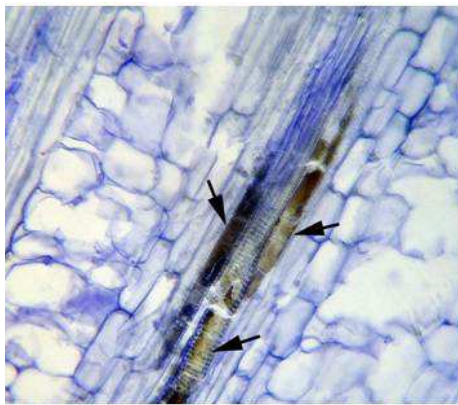
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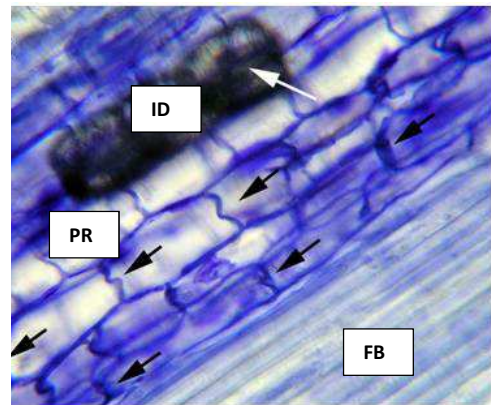
C



D



E



F

Fig. 7. Photomicrographs of organic tissue structure of wheat samples leaf collar zone: A, C, E, F – plants taken in crop formation; B, D - control samples; PR - parenchyma; FB - fibers; ID - idioblasts of some polyphenolic compounds that are not soluble in xylene, chloroform, ethyl alcohol and water; Graph A – arrows marks the bundles of fibers and parenchyma strands that due to asymmetrical arch stem growth to return the optimal spatial position; Graph B, G - parenchyma and sclerenchyma control intact plants, slightly curved arrows marked periklinal parenchyma walls; Graph C, F – arrows shows the direction of growth and stretching of parenchyma cells; Graph D – arrows shows the blockage of plants vessels by some resinous phenolic substances.

In conclusion, NULES Department of Ecobiotechnology and Biodiversity research suggested that hormonal stimulation of meristematic organic tissues may occur as a result of special electromagnetic field modulation.

Results

The correct dimensions and geometry of the complex nature of investigated crop formation and also the registered changes in soil chemical composition and plants tissue allow rejecting hypothesis of natural formations origin such as wind, animal behaviour, insects, growth abnormalities, plants diseases and others. Therefore the main hypothesis on the formations origin is the artificial made. The random formation made due to the actions of agricultural machinery or standard wheat processing excluded because of complex diversified and irregular formation structure, which is situated asymmetrically relatively to the field transport roads. Nontrivial versions about artificial random formations occurrence due to radiation, accidents on chemical factories etc. also seem unrealistic due to lack of analogues due to variations of known factors and relative remoteness of crop formation from the known sources of radiation and chemical stimuli.

So then, the most likely anthropogenic hypothesis is an artificial deliberate creation. Well known that some part of formations occurring around the world, are artificially created by mechanical damage of plants by humans.

However, crop formation researchers (Talbot 1994, Levengood, 1999) noted couple of basic factors of abnormality that helps distinguish an unknown phenomenon from the human-made mystification:

- 1) the absence of mechanical plant damage
- 2) changes in a plant biochemistry
- 3) possible modification of the soil chemical and quality composition
- 4) possible residual effects of electromagnetic that can saved some time.

The investigation of crop formations near Kordyshivka shows the first three of these four basic factors of abnormality and also the verbal evidences on the fourth factor were received.

Analysing of the hypothesis about the human-made mystification we should also take into account that the formation place is located distantly from the highways and the cities at least 15 km, the nearest houses of the Kordyshivka village located at a distance of hundred meters from the formation. The place is not located on hills, and therefore the probability of formation detection from the human height is really problematic. When the particularly the main purpose of mystification is to attract media attention and self-

promotion, it makes this hypothesis very doubtful, especially if taken into account the high difficulty and labour input needed to made formation in short time. Not-obvious semantic content of formation geometric shape is not major but additional argument for not human-made formation origin.

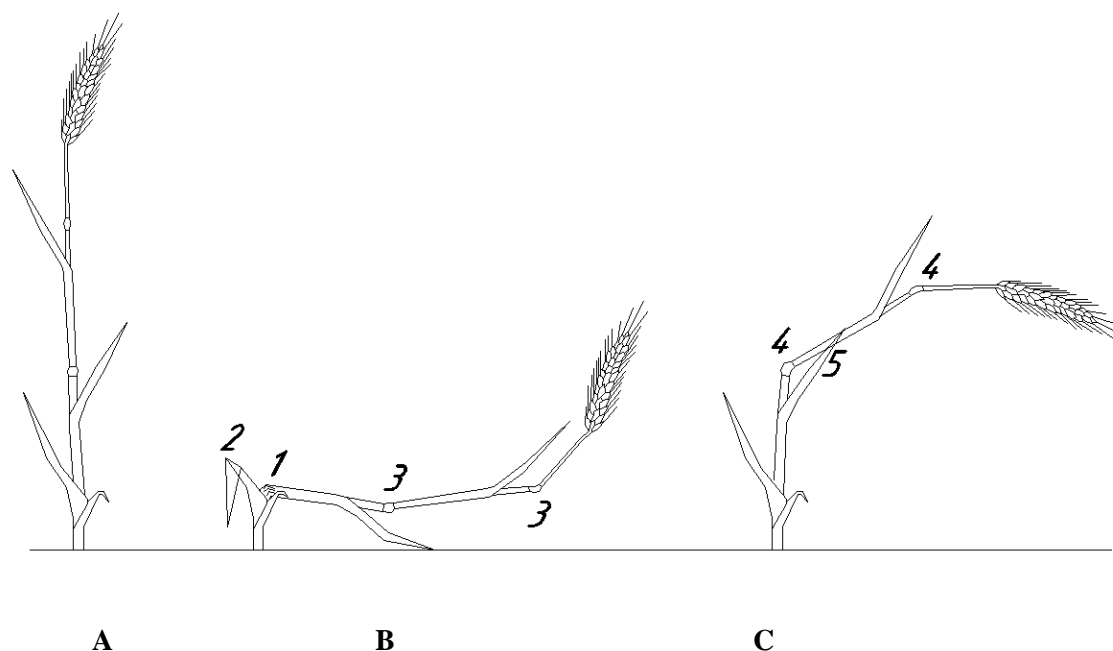


Fig. 8. Comparison of wheat stem change due to mechanical damage and due to unknown anomalous influence: A- obvious wheat stem without change, B - wheat stem change after mechanical damage, C - wheat stem change in a crop formation, 1 - place of mechanical damage, 2 - accompanying leaves damage, 3 – the tropism effect in the node, 4 – bending in the node due to unknown anomalous influence, 5 - leaves particularly unchanged.

Research made the SRCAA "Zond" together with NULES about the character of plants bending indicate that in order to mechanical damage internode zone broken and also leaves damaged in the area of injury. Near root, crown zone are damaged too. Over time the direction plant growth changing, with mostly plant bends up to the sun due to the phototropism phenomenon (see. Below). Also, over a time, the damage of stem or near root, crown zone area in artificial formations can lead to plant wilting, starting from the periphery of the leaves. In a case of a huge mechanical damage, proper transportation of nutrients in stem not happens and the plant dies.

As part of the analysis of different hypotheses was also considered the question about the possible mechanism of changes the plants growth direction. In particular in the study were asked a question: in a case of artificial made of formation can be used other mechanism, except the mechanical damage? Obviously the

only one other mechanism is usable - is the behaviour of the plant itself. It is known that plant like any living organism work as a system with feedback and significant variety of reactions to changes in the environment, shape, line height, colours, etc., depending on the species. This ability is well known as a tropism. In particular, as noted above, plants after mechanical damage can show the positive tropism to the sun light direction. Can change the direction of plants growth in formations achieved by artificially directed tropism? Seems that the directed tropism for single plant can be achieved in artificial conditions using one of the following ways:

- Irradiation plant using electromagnetic field with the directed modulation (electrotropism)
- Arrangement of artificial one side lighting conditions for a plant (phototropism)
- An artificial creation directional mechanical stress in a plant tissues, which leads to compensatory cell layers growth (kind of a gravitropism).

Defined options require additional studies. However, even in a case of their relative effectiveness, their application in a short time, in a full scale and in a conspiratorial field conditions is very doubtful. So then, the hypothesis of human-made mystification of crop formation at this stage of research can be rejected. Phenomenon remains anomalous.

Discussion

The independent expert conclusions obtained in research correlated with world crop formation studies experience (Talbot 1994, Levengood, 1999, Pringle 1999, Haselhoff, Boerman, Bobbink 2014). Currently prevailing hypothesis of the plants changing is the electromagnetic influence. However, the parameters of the radiation that would allow selective and directed influence on each node and led to the registered structural and biochemical changes in many plants to make a picture remain uncertain, as well as a tropism mechanism itself (Shreiber 1958, Cordum, Sobol, et al 2008.). Also any electromagnetic influence cannot explain the change in the soil chemical composition in a formation area.

It is possible that the electromagnetic component may be only a secondary parameters, the effects of deeper cooperation on information level (Kaznacheev, Mikhailova et al 1979), quantum mechanical effects on the mechanisms of plant growth (Vedral, 2011: Maslobrod et al 2009) and so on. We hope that future

studies will allow for a more robust theoretical basis of the phenomenon mechanisms and improve the methodology of the crop formation studying.

Also it remains uncertain the phenomenon existential essence and the semantics of formation figures. Unfortunately, despite the significant accumulated amount of evidences and studies, our understanding level of a formations content is still low. Currently, we can only classify the structure of picture of Kordyshivka formation as a so-called "planetary-like", because of the "secondary" circles situation around the central one (Palgrave-Moore 1991, Pruss 2010). But of course there is only an interpretation in terms of human logic. It is important to remember, that any anthropocentric point of view to such phenomena is wrong and not useful for real scientific investigation.

Opinions that the crop formation pictures is the possible response to our messages to the space and other similarly "communication" hypothesis is more evidence of our interpretations of the phenomenon and its interaction with us rather than evidence of real dialogue. Also we should remember that formations require thorough examination for excluding of possible hoaxes. Theoretically expect from a hypothetical extra-terrestrials manifestations in our plant fields not more realistic than expect chalk marks on our front door.

Phenomenon is reflexive and works as a feedback system (Vallee 1988, Keel, 1996 et al). However, the feedback on our input signals is not necessarily. And obviously it is not the main purpose of the system. We should remember that humankind began to register formation in those days, when the possibilities of observations and measurements did not allow people to understand the level of image in a full scale.

The main fact - plants changed due to the impact of unknown origin. And such unexplained phenomena require careful study. It is not only a question of scientific research and world cognition but also the public safety question. Because the modified wheat grains in formations were harvested, milled and in bread has got to someone's desk.

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