

# Chemical Technology. Control and Management

Volume 2018

Issue 3 SPECIAL ISSUE 4-5

Article 7

10-19-2018

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### Recommended Citation

Korolev, V.A; Bashilov, A.M; and Eshmuradov, Z.O (2018) "The system individualized principles of management of technologies of field husbandry," *Chemical Technology. Control and Management*: Vol. 2018 : Iss. 3 , Article 7.

Available at: <https://uzjournals.edu.uz/ijctcm/vol2018/iss3/7>

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## **Cover Page Footnote**

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## **Erratum**

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ISSN 1815-4840

# CHEMICAL TECHNOLOGY. CONTROL AND MANAGEMENT

2018, Special issue №4-5 (82-83) pp.28-33

International scientific and technical journal  
journal homepage: [ijctcm.com](http://ijctcm.com)

Since 2005

## THE SYSTEM INDIVIDUALIZED PRINCIPLES OF MANAGEMENT OF TECHNOLOGIES OF FIELD HUSBANDRY

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**Abstract:** The system and organized, local individualized agrotechnologies provide on the land ground divided into priority zones, the simultaneous parallel and interconnected performance of a complex of technological operations on production of crop production: operations on preparation of seeds of an agriculture, cultivation of seedling, laying of seedling to the soil, to cultivation of an agriculture, stimulation of her development. Interaction between the carried-out processes is carried out in real time with a possibility of necessary corrections of processes during their performance. A considerable part of technological operations realize without rendering negative impacts on an agriculture, the soil and the environment, with small expenses of energy.

**Keywords:** the agrotechnological system, system and organized agrotechnology, mathematical model, object of agrarian production, bioinformation exchange of agricultures, the local individualized management.

### INTRODUCTION

Basis of the modern theory of design of optimum control of agrarian production – the system-wide dynamic adaptive approach necessary for the description of natural and technogenic processes of exchange and transformation of energy, substance, information as a part of agrotekhnotsenoz (ATTs), as the uniform operated process. Proceeding self-organized natural and not self-organized (consciously organized) technogenic processes in ATTs are interdependent, at a large-scale priority of the first [1,2].

System synthesis analysis of the multicomponent difficult educations similar to ATTs provides their composition decomposition with maintaining properties whole (systems), according to the principles of a fizichnost, modeliruyemost, expediency [3]. The structure of ATTs providing his division into biocenoses (BC) and tekhnotsenoz (shopping center) though corresponds to reality, isn't convenient at the solution of practical tasks of management of processes of production of agricultural products and demands deeper decomposition.

Tekhnotsenoza are steady in development, their construction is subordinated to objectively existing regularities of formation of technical systems [3]. Elements of shopping center, as a rule, independent dynamic systems, are dispersed in space. Their functioning is distributed in time and happens in the environment of uncontrollable stochastic parameters, in the conditions of incomplete use of information and intellectual resources.

Common fault of the agrotechnologies realized today is the weak interrelation between separate technological operations of processes of cultivation of an agriculture. The operations which are carried out in shopping center, though are interconnected by the general technology, are displayed in flow

charts as independent or influencing at each other indirectly and slightly. At the same time they are implemented numerous by special working cars through independent managing directors of influence.

The lack of feedback between groups (stages) of technological operations is notable (preparation of seeds and selection of an agriculture, cultivation of seedling, laying of seedling to the soil, cultivation of an agriculture, etc.), actions for replacement of grades (types, hybrids) of an agriculture on more productive are complicated, works on selection of agricultures drag on in time. Thereof the efficiency of technological processes on the farmland doesn't reach the greatest possible values, material inputs and expenses of technological and energy resources are overestimated, and intellectual are underestimated.

Artificial technical and technological adaptive functions of the advancing reflection of reality, formation of algorithms of achievement of the required consumer purposes in the set tselelogichesky direction have to be inherent in highly effective tekhnotsenoza. In these conditions the role of preventively advancing adapting management of elements of a technogenic part of ATTs, the forecast of development of the self-organized processes in structures of biocenoses is important. Adaptive abilities of the technogenic equipment to bio - to what technologies reflect logical ratios of adaptive acts of maintaining heritability of the carried-out operations and evolution of concrete types of agricultural production. The repeatability of procedures in cycles of technological operations enhances quality of adaptation gained in practice of technological knowledge and experience to the system and organized knowledge base, real production base [4-7].

## 2 METHODS

Essentially important at management of the system integrated technologies to apply adequate convenient mathematical models in application. Settlement bio - the ATTs techno and power models at realization of specific objectives of production have to:

- to generate sets of values of control characteristics of the object of agrarian production (OAP) and also parameters of elements of shopping center, all stages of vegetation of plants and stages of technological processes taking into account action of casual indignations of a macroenvironment (climatic and soil conditions, etc.) and the realized strategy of formation of a harvest;

- to reflect interrelations and background, average and seasonal prospect of all components of processes;

- to predict efficiency of plants and quality of a harvest, their dependence on the operated processes;

- to offer preventive and anticipatory commands of management;

- to provide the maximum use of natural power sources (an exergy of sunlight, water potential, etc.), to estimate an expense of energy, raw material and material resources taking into account technological and technical realization of ATTs.

Difficult dynamic educations, similar to agroecological natural systems, when modeling idealize: in the conditions of a solvable system task allocate defining and reject minor properties of the phenomena, processes, devices. Practically without reducing the accuracy of results, describing systems, they are broken into the ordered sets interacting with each other and exchanging resources, energy and information, functionally focused elements. If to use this principle for ATTs, it is possible to allow the following:

- at division of the carried-out technological processes and ATTs devices into rather independent processes and components it is necessary to raise extent of specification of separate elements of his technical part and the processes corresponding to them;

- change, transformation and development of processes in shopping center submit to objective regularities, similar on structure, changes and interactions in BC;

- inertial changes of characteristics of OAP, external managements, functional parameters of elements of shopping center in time are described by standard mathematical functions (linear,

exponential, harmonious, a technical optimum) or can be grouped from pieces of these functions.

As a result of structurization elements and subsystems of ATTs connected with technological processes, among themselves, and also with the environment are defined.

The main components in the ATTs mathematical model: the efficiency module (an entrance and an exit of the carried-out technological processes, perception of external influences, support of processes of autoregulation in plants) and the module of the top level of shopping center (it is directly connected with external influences, an efficiency module exit, exercises control of all processes, analyzes them, develops and realizes teams of management of processes). Modules of executive working cars are connected with the main modules and occupy a bottom of hierarchy of structure of ATTs.

The most difficult element in structure of ATTs and their models – the efficiency module (EM) uniting OAP and the environment of his dwelling (an entrance and an exit of technological processes, perception of influences of the environment, processes of autoregulation and self-organization in plants). For MT which is difficult system there is a basic possibility of creation of formal substantial model, however its structure and structure are extremely various (a large number of crops, technologies, conditions of their cultivation) and are difficult, and accuracy because of a lack of reliable information about processes and real operating conditions isn't high. It is expedient to refuse application of the MT formal model for concrete technologies and crops and to build abstract phenomenological model of the general class. This model is created on the principles which will provide at operation of ATTs completion of a lack of aprioristic information at a design stage with a posteriori information in the adaptive mode. One of such principles is the principle of power extremeness of self-organization and progressive evolution [1,2].

Controls and analyzes a condition of OAP, develops and realizes teams of management of agroprocesses and groups of the used working cars (WC) in ATTs the operating module (OM) which

is directly connected with MT, the block of sensors, databases and knowledge, external influences. This module functions according to tough regulations of flow charts at realization of standard management and to flexible adaptive management for operational impact on a condition of OAP.

Large volumes of works of technological operations of agroproduction force to use at their performance a significant amount of RM of one type at the same time. Considering it and also the fact that the RM separate groups because of distinction of appointments and individual requirements are rather isolated, it is necessary to enter into structure of ATTs special modules of executive (lower) level of separate RM and management of them. It is expedient to unite numerous WC of the lower level in the ATTs model in N-group of the same cars and to replace conditionally with one  $i - y$ -й WC ( $i=1, \dots, N$ ) to destination, from one  $j - y$  ( $j=1, \dots, M$ ) from the M control systems.

As a rule, rather poorly interconnected with each other by WC technology of separate phases and concrete processes, control systems of them are developed without assessment (or with the minimum assessment) efficiency as a part of ATTs. Achievement of the required values of operational performance of ATTs (the outputs, quality of production, etc.) is provided with use of rational agroreceptions and also is connected with the choice of type, characteristics and designs of RM, ensuring their optimum work according to imposed local technical requirements due to management of processes.

Necessary operating modes of WC are implemented via their power machines (power drives). In particular, adjustable or unregulated drives on the basis of the asynchronous engine, a synchronous, valve, direct current, etc. are a part of WC of the electrified crop systems (ECS). In structures of ATTs and MA for each of listed and also other types of the drive, the separate module is provided. The number of the WC groups corresponds to quantity of types of the used cars, and in the working system and when modeling of the functioning WC defines MIND.

The modular principle of the ATTs organization gives the chance to build MA, programs of calculations also by the modular principle. Structures of ATTs and its MA at the same time in many respects coincide. The specification of elements, laws of change of influences of the environment allows to describe any process in ATTs.

### 3. RESULTS

Innovative it is information also intelligently saturated agrotechnologies. A condition of realization bio - what and techno intelligently saturated agrotechnologies is continuous and total monitoring of ecological conditions, land grounds, parameters of all technological processes in real time.

The land ground is divided into priority zones of seed farming, production of seedling, laying of seedling and cultivation of an agriculture.

On a land ground in priority zones at the same time in parallel it is also interconnected carry out a full complex of technological operations on production of crop production, namely, operations on preparation of seeds of an agriculture, cultivation of seedling, laying of seedling to the soil, to cultivation of an agriculture, stimulation of her development. Power-intensive operations carry out with use of the land technological working units functioning in a zone of laying of seedling and cultivation of an agriculture.

Technological operations of receiving high-quality seeds carry out in a seed farming zone. Then seeds come to a zone of production of seedling for cultivation of qualitative rassadny material about use of the bridge agrounit. Seedling by means of the pilotless flying device (UAV) is moved to a zone of laying of seedling and cultivation of an agriculture. Also the UAV carries out small power-intensive operations on maintenance and stimulation of development of an agriculture at all stages of her vegetation, in particular, local processing of the sites infected with wreckers and diseases, stimulation of depressive zones of development of crops, etc.

Thus interaction between the carried-out processes of a full complex of technological

operations on production of crop production is carried out at the same time in real time with a possibility of performance of necessary corrections of processes during their performance. Expeditious performance of a considerable part of technological operations without rendering negative impacts on an agriculture, the soil and the environment, with small expenses of energy.

The last researches have revealed that processes and the phenomena, not only in a field of activity of the person, but also at interaction in the educations consisting of animal and vegetable individuals of OAP regarding interaction of leaders and followers submit to provisions of the theory of constituents (the interconnected relations). These processes and the phenomena in practice are shown as cooperative bioinformation influences of agricultures at each other: the individuals advancing in the development stimulate acceleration of development of the lagging behind individuals, and lagging behind – slow down development of individuals of the advancing development [8]. It is expedient to consider and use cooperative bioinformation exchanges of agricultures: to strengthen influence of the agricultures advancing in development on acceleration of development of the lagging behind agricultures, to weaken influence of the agricultures which are lagging behind in development on delay development of agricultures of the advancing and satisfactory development. For this purpose on a land ground create the operated zones of production (fig. 1).

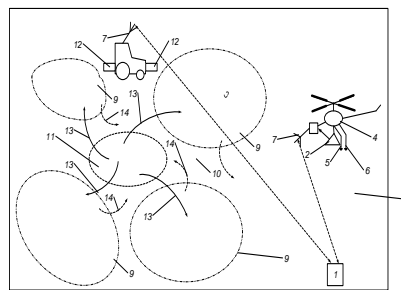


Fig. 1. The device of cultivation of agricultures on the operated zones:

1 – the laboratory operating complex, 2 – the module of visual control of a condition of agricultures, the 3rd farmland, 4 – the pilotless flying device, 5 – working body for introduction of hormonal medicines, 6 – the laser, 7

– means of infocommunication communication, 8 – the executive working unit of realization of agroprocesses, 9 – zones of depressive development of agricultures, 10 – zones of satisfactory development of agricultures, 11 – zones of the advancing development, 12 – technological working bodies on the executive working unit, 13 – the directions of the stimulating electrophysical and/or biochemical impact strengthening cooperative bioinformation action of agricultures of zones of the advancing development on development of agricultures in depressive zones and zones of satisfactory development, 14 – the directions of the return negative impact of cooperative bioinformation exchange of agricultures of depressive zones on development of agricultures in border areas

During automatic control of processes of cultivation of agricultures of the specialized working cars carry out technological impacts on agricultures in zones of depressive development according to production schedules of cultivation of a concrete agriculture in concrete agroclimatic conditions. By results of monitoring of farmlands, reveal on farmlands of a zone of depressive development of agricultures, zones of satisfactory development and a zone of the advancing development. Differentiation of the farmland on zones is carried out on anatomo-morphological features of agricultures, namely, by the geometrical sizes and color characteristics of agricultures or their fragments, by results of the analysis of characteristics of tests of the soil and fragments of agricultures from various zones of the farmland

Strengthen positive electrophysical and biochemical influence of cooperative bioinformation exchange of agricultures (interferences of influences of separate plants at each other) zones of the advancing development on development of agricultures in zones of depressive development and zones of satisfactory development. For this purpose stimulate intensity of development of agricultures in zones of the advancing development and change the gene and phenotypical potential of agricultures for schyot uses of hormonal medicines, laser radiation. Create in addition the zones of the advancing development of agricultures which are interfaced to depressive zones and zones of satisfactory development of agricultures. Weaken negative impact of cooperative bioinformation exchange of

agricultures of depressive zones on development of agricultures in border areas, by the working cars for this purpose specialized make technological operations of increase in intensity of development of agricultures on borders of depressive zones.

Stimulation of development of agricultures in zones of the advancing development due to change of agricultures at the genotipichesky level with use of working body for introduction of hormonal medicines and/or the laser increases productivity of agricultures.

Methodology of design of the system and organized and local individualized agrotechnologies. Fundamentals of methodology of design of the system and organized, local individualized agrotechnologies is inclusion in production of agricultures of the new, earlier not applied equipment and the intellectual resource which is saved up in modern science.

Three main directions are the center of new area of agrarian knowledge: WITH - the system and organized hierarchically built agroproduction object which skeleton determines levels of management (cages, fabrics, bodies, organisms, crops, grounds, regions; SZ - the information and intellectual systems and resources of knowledge (continuous, total, serial-parallel monitoring at all levels of hierarchically organized agroproduction object); SD - the executive hierarchically organized systems which are mutually subordinated robots and the distributed product lines (highly qualified specialists, computers, the air and land equipment).

The space of decisions shows evolution of knowledge and improvement of the equipment in process of agrotechnologies. Process of creative invention is many-sided and can constantly be replenished, following the interactive and iterative scheme of stay and accumulation of new knowledge.

### Conclusions

1. The system and organized, local individualized agrotechnologies increase efficiency and efficiency of processes of production of agricultural products on farmlands, create conditions of essential increase in effective management of processes of cultivation of

agricultures with an opportunity to exercise control of a full complex of technological operations of production of agricultures in real time.

2. In realization of the offered innovative agrotechnologies a considerable part of operations, for example, on sites where there are rejections of characteristics of parameters of processes from set (the sites infected with wreckers and diseases; depressive zones of development of crops, etc.) for obtaining operational information and quick response to the arisen situation on these sites use the technological devices making a minimum of harmful effects on the environment and an agriculture, for example, the pilotless flying device.

3. The system and organized and local individualized agrotechnologies provide possibilities of account and use of cooperative bioinformation exchanges of agricultures: to strengthen influence of the agricultures advancing in development on acceleration of development of the lagging behind agricultures, to weaken influence of the agricultures which are lagging behind in development on delay development of agricultures of the advancing and satisfactory development.

4. The system and organized, local individualized agrotechnologies updated new scientific and technical decisions open a possibility of attraction of the information and intellectual

resource embodied by modern achievements of science and technology for ensuring high-precision agrarian production and attractive working conditions of the rural toiler.

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