УДК 633.1:631.527

METHODOLOGICAL APPROACHES TO SIMULATING AND FORMING TECHNOLOGICAL INNOVATIONS IN PLANT PRODUCTION

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Technological innovation is a strategic tool for ensuring competitive production as part of the innovative-investment process. At the same time the domestic agribusiness is still in a transitional phase from agriculture to agribusiness, which does not allow full realization of the leading role of technology, on the one hand, and provision of a necessary level of compensation capacity and stability of production on the other hand. Today methodology and practical formation of agricultural technologies in plant production need new approaches and solutions.

innovation, technology, technology element, transfer, module

Study Methods. The studies were conducted according to the tasks of NAAS Programs 46, 47 (2006-2010) and 41 (2011-2014) at the main institution of the Center for Science Provision of Agribusiness in the Kharkiv region - Plant Production Institute nd. a V.Ya. Yuryev of NAAS. The study subject was technological innovations in plant production. Developing working models we had regard to positions of the organization, structural and hierarchical system generation, formalization and systematic approach based on cross-cutting coordination.

Study Results. Currently, effective implementation of the whole block of competitive advantages is of strategic importance for Ukrainian plant production. One of the main vectors in this direction is gradual transition from outdated and inefficient technologies (in fact, separate innovative elements on the basis of rather conservative technologies) and reaching the level of standardized raw materials that are integrated into other industries.

In recent years, Ukrainian agribusiness took to a leading position in the world in maize, wheat and sunflower export. To maintain this dynamics in future and increase production and export, the most complete realization of genetic potential of productivity (RGPP) and of stability of production and processing through transfer of integral technologies based on new organizational principles is extremely important.

The investigation of 9 model field cultures in the Kharkiv region shows that maize, winter wheat and winter rye (fragmentary) have the highest average many-year yields in the grain complex (3.0 t / ha). Adhering to the declared and intended yields of 5.0 t / ha, at present only maize can be regarded as a feasible and attractive transfer object within the confines of current technologies (see Fig. 1).

In this respect the importance of positive impact of technological and scientific provision, on the one hand and increasing of the export and investment potential on the other, are discernible above all. Today in the world agricultural production, 40-50 technologies are actively applied; they are owned by economically powerful innovative companies. At the same time in the domestic agribusiness, leading positions in this block belong to the system of technological support of different agricultural industries and, in the first place, to plant production.

A battery of technological operations directed to the achievement of appropriate qualitative and quantitative indices can be regarded as one of the most informative characteristics of existing technologies. If we analyze the number of technology elements as exemplified by the 3 major winter crops (winter wheat, winter rye and winter triticale), we can trace corresponding patterns and differences (Table 1).

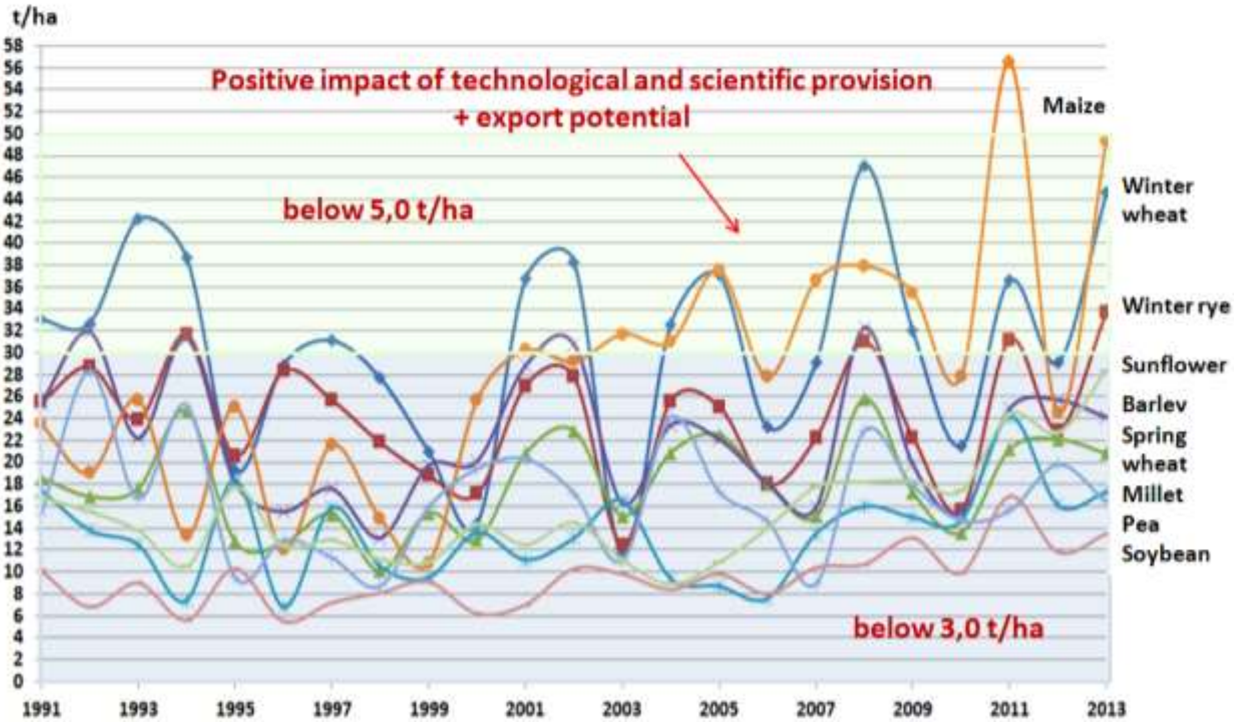

Fig.1. Analysis of the yield dynamics of the major field crops in the Kharkiv region and feasibility of their defining as transfer objects, 1999-2013, t/ha

The summarized average values of technological operation numbers in winter crop technologies were as follows: with high resource support – 22; with sufficient resource support – 31; with satisfactory resource support – 27; and with low resource support - 22. The average values for winter crops at different levels of resource support amounted to 26 technological operations per 1 agrotechnology. This means that agrotechnologies with the number of technological operations up to 30 inclusive can be considered with sufficient tenability.

Table 1. Analysis of the number of technological operations in cultivation technologies of winter crops on different levels of resource support (model object)

Culture	Predecessor	Level of resource support	Technological operations, pcs.
Winter wheat	Pulses	High	25
		Sufficient	35
		Satisfactory	29
		Low	22
Winter rye	Pea	High	22
		Sufficient	30
		Satisfactory	25
		Low	24
Winter triticale	Pulses	High	19
		Sufficient	28
		Satisfactory	28
		Low	21

The number of technological operations during production of standardized raw materials is strictly regulated and quality-oriented, while upon shortage of resource support in ordinary technologies the most essential elements focused on reduction in costs only remain. It is from this point of view in the transfer system of integral technologies, it is necessary to achieve compliance with the principles of cross-cutting coordination and close connection among all elements.

If we take a module-forming component, a triplet (triangular pyramid), as the basis, we can review and analyze relationships between 4 elements, each of which has a direct connection to another (see Fig. 2).

Isolation of 3 structure-forming blocks in a technology (vertically): innovativeness, compensation capacity and competitive advantages within the basic module as well as integration, motivation and economy within the working module allows starting logistics approaches to grouping modules together and achieving the highest possible level of mutual relationships.

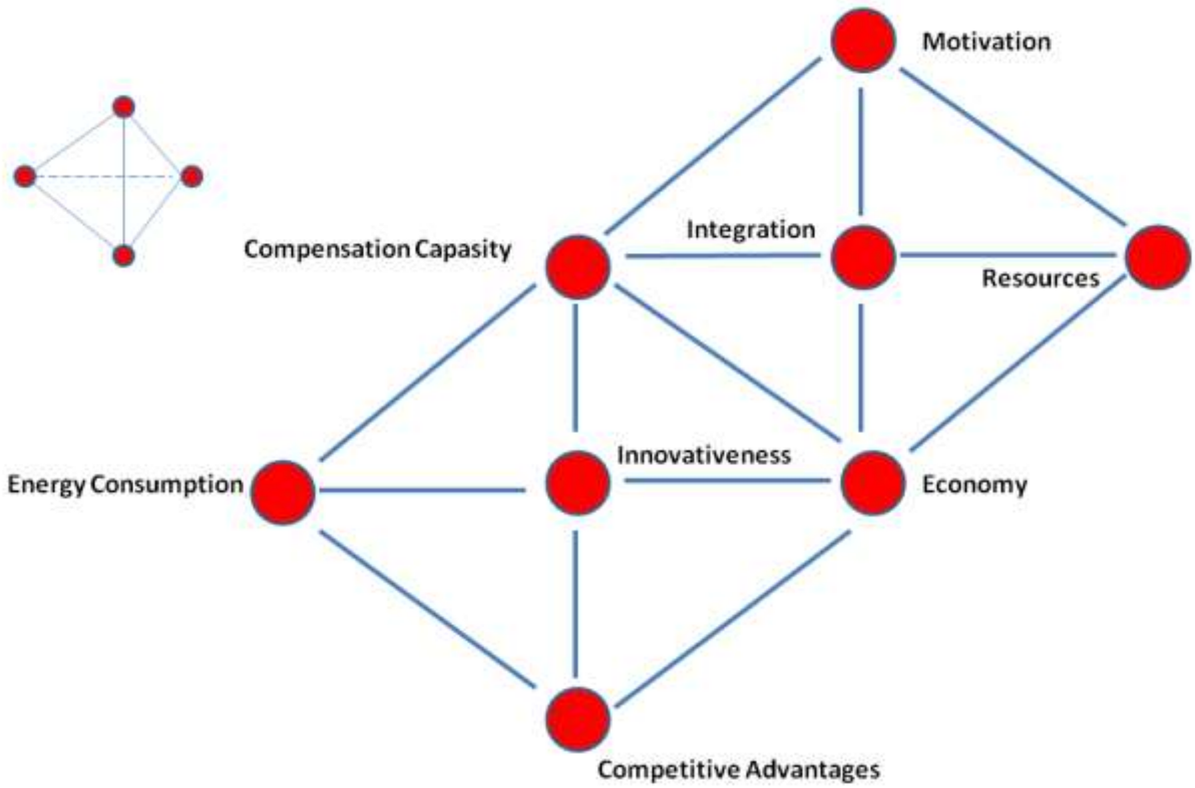

Fig. 2 Logistics of technology formation according to the module principle

The model grouping 6 triplets in one semimodule and associating two semimodules in a basic one looks the most feasible (see Fig. 3). In this case, sides of individual triplets take into account corresponding regression coefficients between technology elements. Within one basic module (block) on the basis of cross-cutting coordination, 9 elements are joined, 3 of which are structure-forming, including 1 determining element that determines the orientation of a technology (in the center). 6 working elements of a technology (along the perimeter) can be variables, depending on objectives and available resources (see Fig. 4).

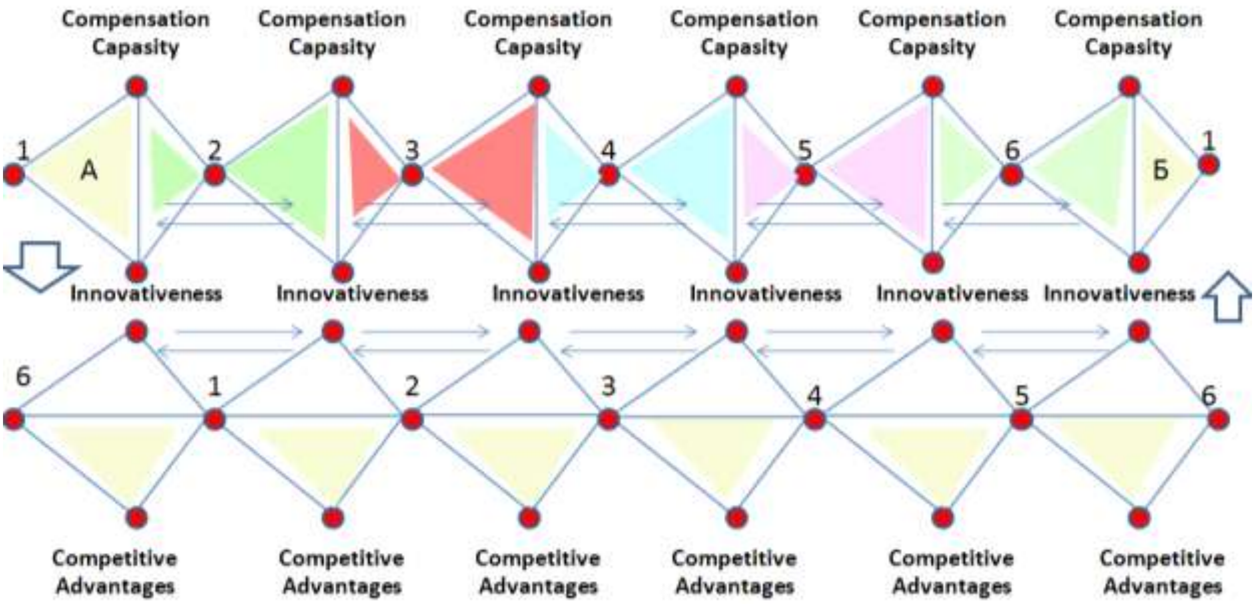

Fig.3. Formation of technological semimodules and modules from separate triplets

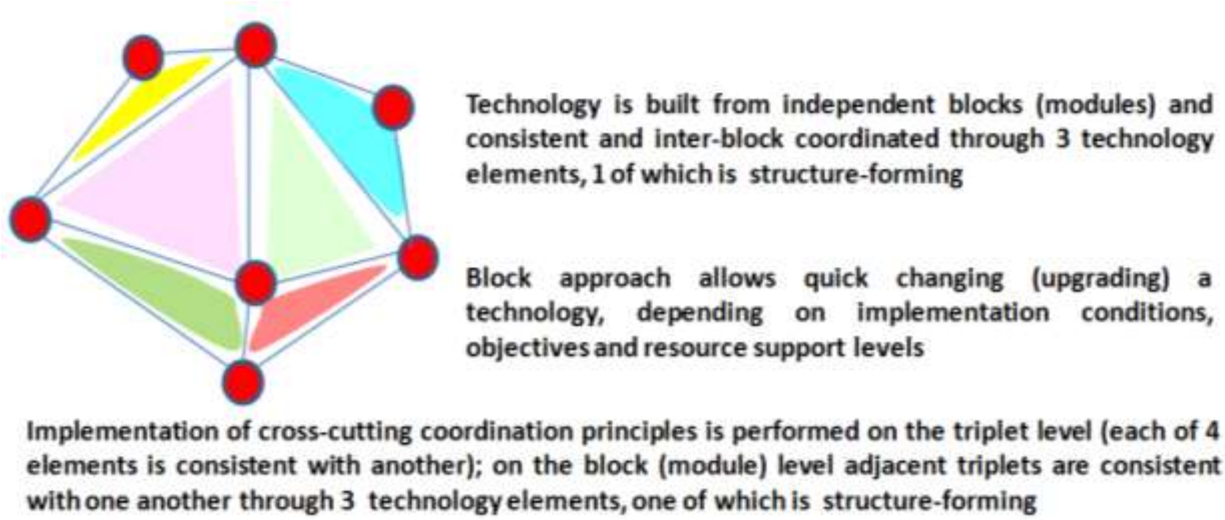

Fig. 4. Evaluation of the block (modular) formation system of an integrated technology based on cross-cutting coordination

Considering possible options for technology formation via modular principle based on cross-cutting coordination indicates that the maximum feasible level equals to 30 technological operations (see Fig. 5). This almost coincides with real data of existing technologies for 3 winter crops (Table 1). Further increase in the number of technological elements within a modular principle-based technology will be strongly associated with an enhancement in commutative elements and combinatorics complexity with the central basic module. At the same time for certain specialized technologies there is also a possibility of introducing additional modules, depending on the provision of a proper level of standardized raw materials.

Using the modular formation principles of technologies in plant production is a part of the transfer system of adapted technologies and launch mechanisms of scientific support commercialization.

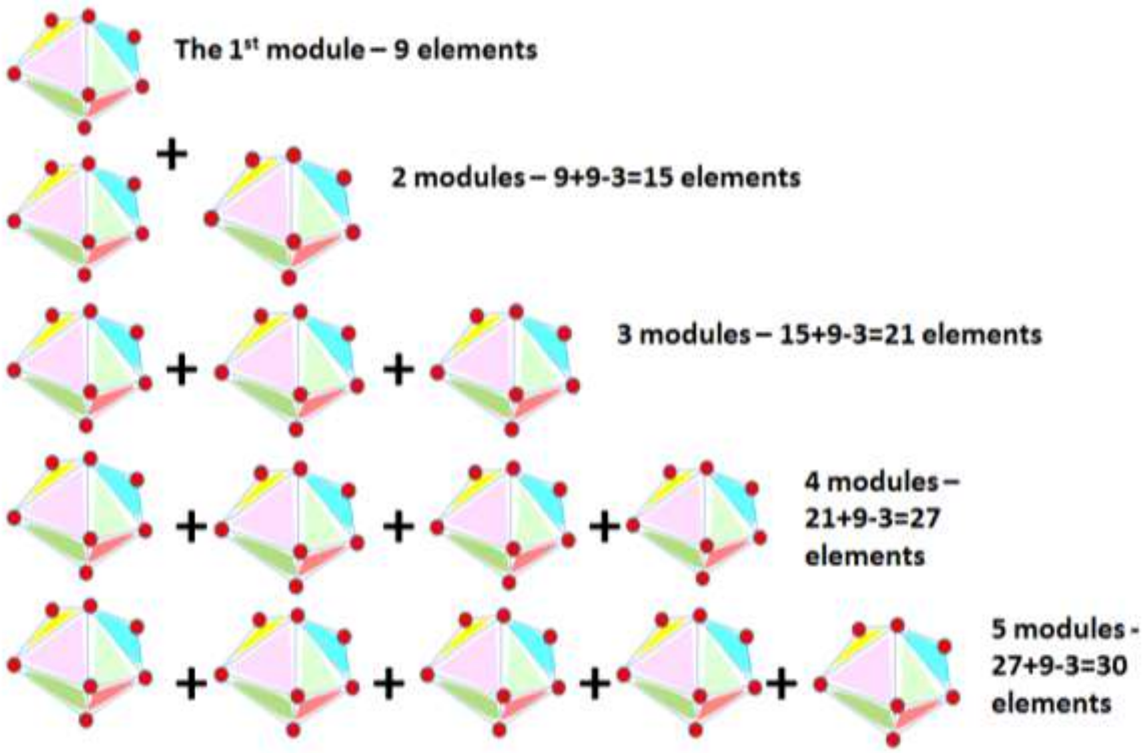

Fig. 5. Substantiation of the module and technological operation numbers in the organization of an integrated technology based on cross-cutting coordination

The following logistic scheme is used in the realization of the approaches above-mentioned (see Fig. 6).

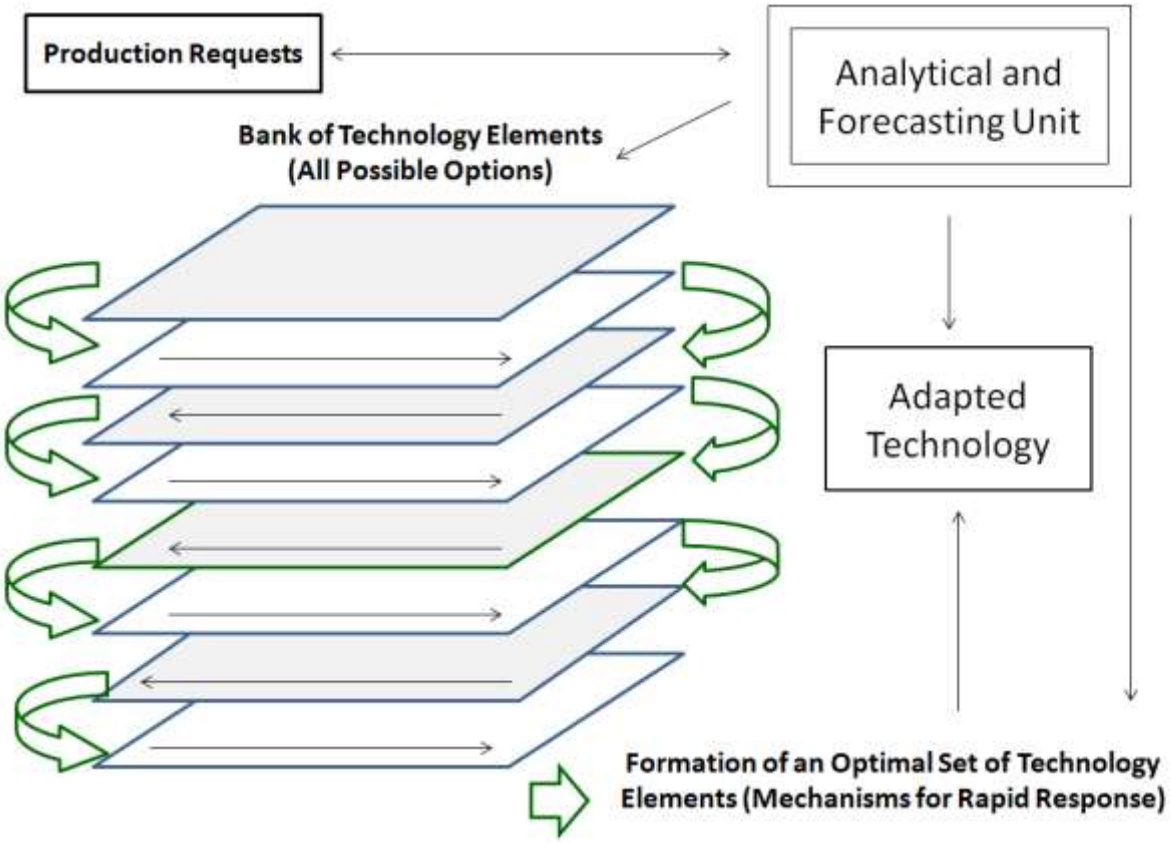

Fig. 6. Logistic scheme of the formation of an adapted technology

According to the needs of production and the relevant specialized markets analytically - the predicted block to create a bank of elements of technology, on the basis of which is formed by the optimal ratio and communication within the individual modules and their combinations with the achievement of the required parameters.

Based on a forecast of the growth conditions or changes in the technological scheme and soil - climatic conditions, technology can be implemented operational adjustments, thereby significantly increasing the level of rapid response and kompensatorikov and more guaranteed to be declared by the final results obtained. Such an approach provides a real opportunity to commercialize technological support breeding and seed innovation in the field of plant and ensuring the refinancing of science and its development on innovation vector.

The proposed approaches on the one hand is the structure-organizational innovation, and on the other - are the unifying element of the strategic and practical mechanism to ensure a higher level kompensatoriki agricultural technologies.

Conclusions. 1. Approximation of domestic APT to technological milestone and effective implementation of the competitive advantages possible torjvgtycfnjhbrflko with the active transfer of complete technology.

2. The proposed approaches are organizational innovation and the specific product, aimed at the formation of the components of the innovation system of consumption with the creation of conditions for start of commercialization mechanisms real technological support.

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МЕТОДОЛОГИЧЕСКИЕ ПОДХОДЫ МОДЕЛИРОВАНИЯ И ФОРМИРОВАНИЯ ТЕХНОЛОГИЧЕСКИХ ИННОВАЦИЙ В ОТРАСЛИ РАСТЕНИЕВОДСТВА

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Для отрасли растениеводства стратегически важной является эффективная реализация блока конкурентных преимуществ. На примере отрасли растениеводства проведен анализ состояния и проблематики формирования целостных технологических инноваций с соблюдением принципа сквозной координации.

Среди основных культур в рамках действующих технологий на конкурентном уровне как привлекательный обьект трансфера выделена кукуруза. Обоснована актуальность перехода от устаревших и неэффективных технологий с выходом на уровень интегрированных сырьевых ресурсов. На примере 3-х озимых культур (озимая мягкая пшеница, озимая рожь и озимое тритикале) проанализировано количество действующих технологических операций при различных уровнях ресурсного обеспечения.

Средние показатели количества технологических операций по озимым культрам составляли при высоком уровне ресурсного обеспечения – 22, достаточном – 31, удовлетворительном – 27 и низком – 22. Организационно максимально обоснованным уровнем технологи является 30 технологических операций (средний показатель по выборке – 26). Количество технологических операций при производстве стандартизированных сырьевых ресурсов является строго регламентированным и направленным на качество.

Проанализированы и сформулированы методологические подходы группирования технологических операций в триплеты и формирования технологии по модульному принципу на основе сквозной координации.

Использование принципов модульного формирования технологий для отрасли растениеводства является элеменом системы трансфера адаптированных технологий (обеспечение повышенного уровня компенсатолрики агротехнологий) и запуска механизмов коммерческой реализации научного сопровождения.

Реализация принципа сквозной координации осуществляется на триплетном уровне (каждый из 4 элементов согласуется один с другим напрямую). Смежные триплеты согласуются через 3 элемента технологии, один из которых является структурообразующим.

Наиболее обоснованной выглядит модель группировки 6 триплетов в один полумодуль и обьединение двух полумодулей в базовый блок (всего 9 элементов, в т.ч. 3 структурообразующие и 6 рабочих). Организационно и структурно сбалансированной технология выглядит до 5 модульного уровня включительно (30 элементов технологии).

МЕТОДОЛОГІЧНІ ПІДХОДИ МОДЕЛЮВАННЯ І ФОРМУВАННЯ ТЕХНОЛОГІЧНИХ ІННОВАЦІЙ В ГАЛУЗІ РОСЛИННИЦТВА

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Для галузі рослинництва стратегічно важливою є эффективна реализація блока конкурентних переваг. На прикладі галузі рослинництва проаналізовано стан і проблематику формування цілісних технологічних інновацій з дотриманням принципу наскрізної координації.

Серед основних культур в рамках діючих технологій на конкурентному рівні як привабливий об'єкт трансферу виділено кукурудзу. Обґрунтовано актуальність переходу від застарілих та неефективних технологій з виходом на рівень інтегрованих сировинних ресурсів. На прикладі 3-х озимих культур (озима м'яка пшениця, озиме жито та озиме тритикале) проаналізовано кількість діючих технологічних операцій при різних рівнях ресурсного забезпечення.

Середні показники кількості технологічних операцій по озимих культрах складали при високому рівні ресурсного забезпечення – 22, достатньому – 31, задовільному – 27 та низькому – 22. Організаційно для технології максимально обґрунтованим рівнем є 30 технологічних операцій (середній показник по вибірці – 26). Кількість технологічних операцій при виробництві стандартизованих сировинних ресурсів є суворо регламентованою та орієнтованою на якість.

Проаналізовано та сформульовано методологічні підходи групування технологічних операцій в триплети та формування технології за модульним принципом на основі наскрізної координації.

Застосування принципів модульного формування технологій для галузі рослинництва є елеменом системи трансферу адаптованих технологій (забезпеченння підвищеного рівня компенсаторики агротехнологій) і запуску механізмів комерційної реалізації наукового супроводу.

Реалізація принципу наскрізної координациї здійснюється на триплетному рівні (кожен з 4 елементів напряму узгоджується один з одним). Суміжні триплети узгоджуються через 3 елементи технології, один з яких є структуроутворюючим.

Найбільш обгрунтованою виглядає модель групування 6 триплетів в один напівмодуль та об'єднання двох напівмодулів в базовий блок (всього 9 елементів, в т.ч. 3 структуроутворюючих і 6 робочих). Организаційно та структурно збалансованою технологія виглядає до 5 модульного рівня включно (30 елементів технології).