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INTEGRATED METHODS OF CONTROL OF THE *LEPTINOTARSA DECEMLINEATA* SAY, 1824 (COLEOPTERA: CHRYSOMELIDAE) IN MOUNTAINOUS AREAS

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Abstract

The potato culture spreads widely in the private and farmer economies in many countries, including Azerbaijan. But the research of many scientists shows that tons of products are lost under an influence of the harmful organisms. In this connection the integrated chemical and biological control methods of combating of the Colorado potato beetle's *(Leptinotarsa decemlineata* Say, 1824) (Coleoptera: Chrysomelidae) larva were applied in the Gazakh-Tovuz region of Azerbaijan. The researches were carried out in 2014-2018. In order to control *L. decemlineata* larva during the research years Mostar 20 SP (0.02; 0.04; 0.06 kg/ha), Mosetam 20 SP (0.02; 0.04; 0.06 kg/ha), Ramplan 20 SP (0.02; 0.04; 0.06 kg/ha), Cypersan 25 CS (0.2; 0.4; 0.6 1/ha) and other preparations have been tested and the optimal doses have been determined. Karate Zeon 5 CS (0.1 1/ha) preparation was applied under a standard variant. The biological efficiency was 83.3 – 95.8% under a version of pickling with Mosetam 20 SP preparation (0.06 kg/ha). 0.5; 1.0; 1.5% solution of the Bitoxybacillin (BTB) and Boverin microbiological preparations were used against *L. decemlineata* under five variants and four repetitions during early sowing. 1.0 and 1.5% solution of the Boverin microbiological preparation showed 50% biological efficiency. The preparations being applied against Colorado potato beetle have a high biological efficiency in the indicated doses, don't exert any phytotoxic influence on plants.

Keywords: Colorado potato beetle, integrated methods, pest management, plant protection

1. Introduction

The UN General Assembly Conference on Environmental Protection and Development in Rio de Janeiro in June 1992 received a document entitled "Agenda 21" of the Long Agenda for future action on a global scale. The purpose of this document is to prepare for the challenges of the 21st century (Olsen, 2014; Devaux et al., 2014). This program introduces the importance of soil, water and atmospheric degradation, forest protection and conservation of biodiversity. One of the responsibilities of humanity is to provide the world's population with agricultural products. Research shows that there is an average of 48 grams of protein per day per capita, but this figure should be 100 grams. More than 60% of the population suffers from malnutrition, 30% of them starve (Gerasimova, 2007).

The modern development of human society is closely related to environmental problems, these problems also exist in agriculture. To meet the needs of the world's population in agricultural products, various works are carried out. One of these measures is to increase the productivity of agricultural plants. Various structural pesticides and agrochemical substances are widely used to increase yields, which causes environmental pollution. (Ester et al., 2011; Ulyanenko et al., 2015; Popov et al., 2015; Ropek and Kolodziejczyk, 2018; Gallego et al., 2020; Dupuis et al., 2021; Taylor and Dawson, 2021). More than 300 million tons of fertilizers and 4 million tons of pesticides are annually introduced into the agro- and biocenosis, which causes imbalance in the biosphere (Ecological engineering for pest management, 2004; Hasanpanah, 2012). Since the middle of the last century, measures have been taken against the pesticide syndrome, which later became known as integrated control measures. Scientific and technical development requires the improvement of integrated control. The use of this system should guarantee the preservation of the ecological balance in the environment, the non-accumulation of toxic residues in agricultural products, the creation of normal living conditions for living organisms in biocenoses, and so on.

Recently, the integrated control system has sometimes been referred to as "population management". This shows that the purpose of this system is not to eliminate pests, but to protect the biosphere as a whole. Therefore, the application of the system of integrated control measures should be carried out in the form of a scheme of sequential (corresponding to local conditions) consistency of predictive, quarantine, agrotechnical, genetic, biological, mechanical, physical and chemical control methods.

Our investigations show that the following problems exist in potato growing in the Gazakh-Tovuz region of Azerbaijan:1) incorrect definition of the sowing time of the vegetative material; 2) detection by farmers of potato bulb degeneration, abnormal development and other indications; 3) thickening of the tillage layer during various agrotechnical measures; 4) chaotic development of the harmful organisms in agrocenosis; 5) non-germination of 60–70% buds on the vegetative tillage material (Huseynov, 2012). Based on the results of our research, it can be said that in order to obtain a high and sustainable potato yield in the studied territories, it is necessary to determine the species composition, distribution area, bioecological characteristics of the Colorado potato beetle *(Leptinotarsa decemlineata* Say, 1824) (Coleoptera: Chrysomelidae) and the damage caused by them. In addition to agronomic measures, the

preparation of effective control measures is of great importance for the development of potato growing in this region.

2.Material and methods

2.1.Object

The area of the Gazakh-Tovuz economic region is 15% of the zone of the Republic of Azerbaijan. The region is located at a latitude of 40^0 80^1 and 41^0 43^1 North , at a longitude of 44^0 95^1 and 46^0 82^1 East. The plain, foothill and mountainous zones of Gazakh, Shamkir, Tovuz, Aghstafa, Gadabay districts include in Gazakh-Tovuz region. A total area of the region is 546.7 thousand hectares. The rational temperatures totally reach 3800–4400^{0}C. The length of vegetation period is 213–210 days. An annual quantity of the precipitations changes by 250–810 mm. In terms of humidity, the region belongs to the semi-humid and arid zone. Our research was carried out in the mountainous zone of Gazakh-Tovuz region, at an altitude of 500-1000 m above sea level. The mountain-brown, mountain-gray-brown soils widely spread in the research object.

2.2.Methods

To determine the percentage of damage to the surface organs of plants, 20 samples were examined in the diagonal direction of the field and 5 plants in each sample. In this case, the distance between the samples was taken to be the same. The percentage of plant damage was calculated using the following formula (1) (Shafibayov,1964):

$$P = \frac{n \cdot 100}{N}, \qquad (1)$$

Where "*P*" is percentage of damage to tubers, shoots and leaves, "*n*" is a number of damaged tubers, shoots and leaves, "*N*" is a total number of the examined tubers, shoots and leaves, "*100"* is a conversion coefficient to percentage.

The economic injury level of the pests over the generations was calculated according to the formula (2) by Tansky (1988):

$$EIL = \frac{E \cdot A \cdot P \cdot ST \cdot PT \cdot SEC}{FP \cdot SP \cdot PL \cdot BE \cdot SI} \cdot \left(1 + \frac{HE}{SP}\right), \qquad (2)$$

Where "*EIL"* is a economic injury level (number), "*E"* is a expenses for control (AZN (Azerbaijani manat)), "*A"* is a additional expenses (AZN), "*P"* is a profitable (%), "*ST"* is a species tolerance, "*PT"* is a physiological tolerance, *"SEC"* is a social-ecological coefficient, "*FP*" is the factual product (kg), "*SP*" is a selling price of product (AZN), "*PL*" is a product loss per person (kg), "*BE"* is a biological efficiency (%), "*SI* " is a surviving individuals, "*HE"* is a harvest expenses (AZN).

During the years of research, it was planned to carry out chemical control of the main pests affecting the surface organs and tubers of the potato plant. The experiments were carried out in four replicates according to 5 variants. The area of each repetition was taken equal to 50 m^2. Observations of the biological effectiveness of the preparations and calculations were performed after 5; 10; 15; 20 days of the disinfection and before harvest. The biological efficiency of the preparations was determined by the Abbott formula (3) (1925).

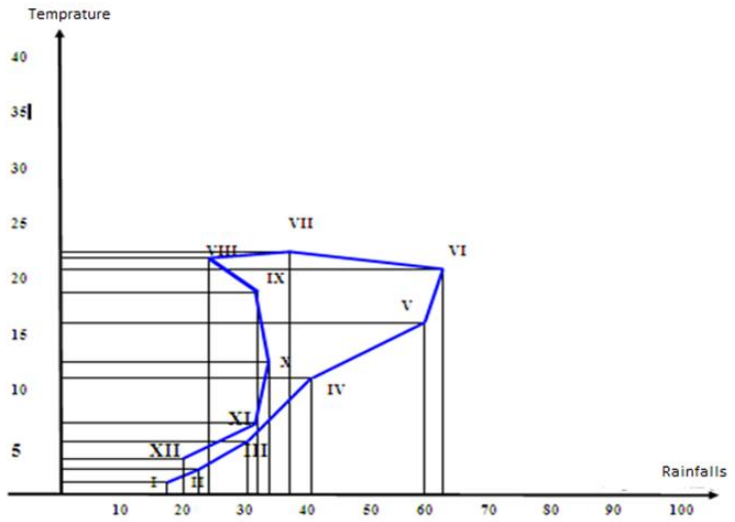
$$BE = \frac{(N-n) \cdot 100}{N}, \qquad (3)$$

Where "*BE"* is a biological efficiency of the preparation (%), "*N*" is the number of the pests after disinfection in the control variant, "*n"* is the number of the pests after disinfection in the experimental version, "*100"* is a conversion coefficient to percentage.

3. Results and discussion

It should be noted that the Colorado potato beetle more damages the potato plant in the early stages of plant development. This is due to the high nutritional value of potatoes at the first stage of development and the low green mass of the plant. Therefore, it is very important to carry out the activities included in the system of integrated control measures at the optimal time. Otherwise, plants damaged by pests at the beginning of the growing season will have difficulties with the formation of a crop in the next period of development.

In order to establish the economic injury level of *L. decemlineata* during the years of research, experiments were carried out consisting of four variants in potato sowings from the Sabirkend of the Shamkir region and Slavyanka of the Gadabay region. By studying the bioecological characteristics of *L. decemlineata* in the research area at an altitude of 900-1000 m above sea level, a bioclimogram was compiled. (Fig. 1). As can be seen from the bioclimogram, an increase in precipitation by 20-60 mm contributes to the development of pests. Unfortunately, the amount of precipitation in this region is often higher than these parameters, which creates a better environment for the development of *L. decemlineata.* The development of one generation of the Colorado potato beetle lasts 48-55 days.



Note: 1. I-XII-show months.
2. The blue line shows the trajectory of the pests development.
***Fig. 1**. Boiclimogram of L. decemlineata in the potato sowings of the zones till 900- 1000 m above sea-level (Shamkir district, Sabirkend settlement).*

The experiments consisting of four versions were also carried out in the Slavyanka village. While studying the economic injury level, a quantity of the pests (larvae) and the degree of plant damage has been compared with the expenses for the chemical control. For this purpose, splashing with the Koru-Alpha (0.03 1/400 liters of water) preparation was performed under the second, third and fourth (control) variants during the first generation development, under the first, third and fourth (control) versions at a period of the second generation development, under the first, second and fourth (control) variants during the third generation development (Fasulati, 1971). For each of the experimental and control variants, the productivity of damaged and healthy plants were determined (Table 1).

Table 1

Disinfection scheme.

area / generation	I	II	III	IV
I	-*	+*	+	+
II	+	-	+	+
III	+	+	-	+

* "-" – disinfection was not performed, "+" – disinfection was performed.

According to the sowing scheme (70 cm x 30 cm measure), the product loss and its cost were revealed (Table 1). Besides, the expenses for the chemical control were exacted. The expenses for the chemical control in this generation amounted to $27 (Klisenko et al., 2008).

After the product loss was exacted the economic injury level of the pests over the generations was calculated by formula 4 (Tansky, 1988):

$$EIL = \frac{47 \cdot 1.1 \cdot 3 \cdot 1 \cdot 0.8 \cdot 1}{300 \cdot 50 \cdot 0.0042 \cdot 0.85 \cdot 0.15} \cdot \left(1 + \frac{2}{50}\right) = \frac{124}{8.03} \cdot 1.04 == 15.4 \cdot 1.04 = 16.0\ number\ \frac{larva}{10}\ plant\ (I\ generation), (4)$$

$$EIL = \frac{47 \cdot 1.1 \cdot 3 \cdot 1 \cdot 0.8 \cdot 1}{300 \cdot 50 \cdot 0.0035 \cdot 0.91 \cdot 0.09} \cdot \left(1 + \frac{2}{50}\right) = \frac{124}{4.3} \cdot 1.04 = 28.8 \cdot 1.04 = 29.9\ number\ \frac{larva}{10}\ plant\ (II\ and\ III\ generations)$$

Calculations showed that when 15-16 larvae were found on 100 plants and the amount of damage was up to 25% in the first generation, the cost of the lost product ($66) was 2.3 times higher than the cost of chemical control ($28). In the second and third generations, the cost of the lost product was $60 (2nd generation) and $57 (3rd generation), respectively. Damage of 25% (in generation I) and 50% (in generations II and III) of the

potato plant by the *L. decemlineata* was identified as an economic injury level of the pests over the generations (Table 2).

Table 2.

Economic injury level of *L. decemlineata* over the generation

Variants (generation)	The number of larvae per 100 plants or the percentage of plant damage,%	product ivity, kg / ha	product loss in compari-son with the con-trol, kg	product loss per one larva, kg	Product loss from hectare		Number of larva in hectare
					kg	AZN	
I generation	5% or 7–8 larva	37900	0.180	0.024	100	50	4145.8
	5–25% or 15–16 larva	37780	0.397	0.025	220	110	8568.0
	25–50% or 29–30 larva	34490	6.349	0.215	3510	175.5	16307.0
	50–75% or 60–60 larva	32670	9.642	0.154	5330	266.5	34548.7
	more than 75% or 120–125 larva	30600	13.386	0.109	7400	370	67715.5
II generation	5% or 7–8 larva	37960	0.072	0.009	40	20	4145.8
	5–25% or 15–16 larva	37930	0.126	0.008	70	35	8568.0
	25–50% or 29–30 larva	37800	0.361	0.012	200	100	16307.0
	50–75% or 60–65 larva	34200	6.874	0.109	3800	190	34548.7
	more than 75% or 120–125 larva	32200	10.492	0.085	5800	254	67715.5
III generation	5% or 7-8 larva	37980	0.036	0.004	20	10	4145.8
	5–25 % or 15–16 larva	37960	0.072	0.009	40	20	8568.0
	25–50% or 29–30 larva	37810	1.628	0.055	190	95	16307.0
	50–75% or 60–60 larva	34800	5.788	0.092	3200	160	34548.7
	more than 75% or 120–125 larva	33720	7.742	0.063	4280	214	67715.5
Control	-	38000	-	-	-	-	-

As can be seen from Fig. 2, *L. decemlineata* injures the potato plant in the early stages of plant development.

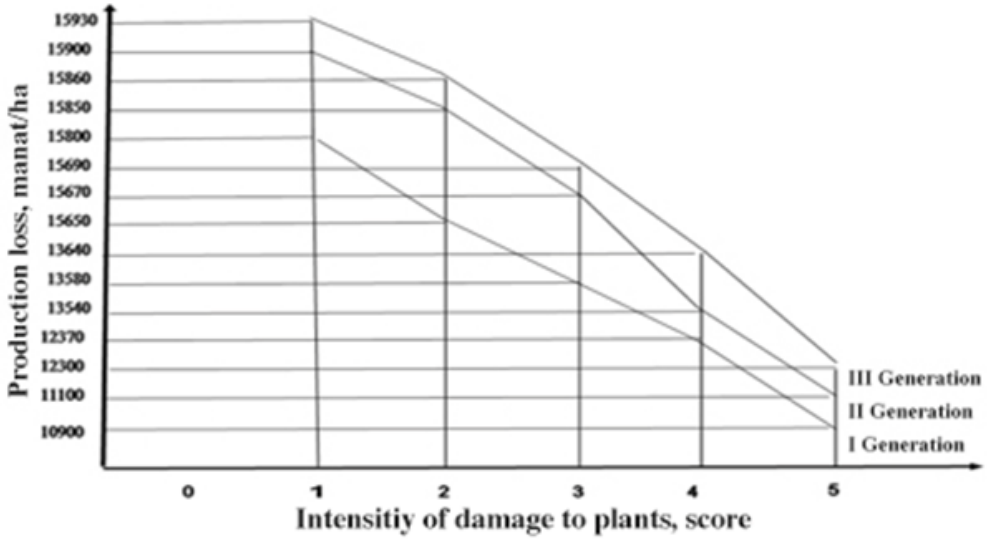


Fig. 2. Economically harmful limit progeny of L. decemlineata.

3.1.Chemical control measures against L. decemlineata: application of the selective pesticides

When developing measures to combat *L. decemlineata*, we got acquainted with the research of internal and foreign scientists of recent years and took into account the results of their research (Goehring and Oberhauser 2002; McSorley 2003; Munyiri and Ishikawa, 2004; Shelton, 2004; Bosa et al., 2005; Saxena et al., 2006; Kakharov, 2008; Agansonova et al., 2011; Malyuga et al., 2013; Fisechko, 2013; Butov and Boeva, 2013; Abrosimova et al., 2014; Suffert and Ward 2014; Wierzbowska et al., 2016; Zarzecka and Gugała, 2018). For the purpose to control *L. decemlineata* larva during the research years Mostar 20 SP (0.02; 0.04; 0.6 kg/ha), Mosetam (0.02; 0.04 ; 0.06 kg/ha), Ramplan 20 SP (0.02; 0.04 ; 0.06 kg/ha), Cypersan 25 CS (0.3; 0.5; 9.7

I/ha), Confidor 20 LS (0.3; 0.5; 0.7 I/ha), Supercor 2.5 CS (0.1; 0.2; 0.3 I/ha), Koru-Alpha (0.01; 0.03; 0.05 I/ha), Fastkill (0.2; 0.3; 0.41 I/ha), Cyperkiller (0.2; 0.3; 0.4 I/ha), Constar (0.2; 0.3; 0.4 I/ha) preparations were tested, and their optimal doses were established. The test-experimental works were performed under 5 variants and 4 repetitions over the years, Under a standard variant Karate Zeon 5 CS (0.1 l/ha) preparation was applied (Table 3). Each secondary area was 250 m^2. To determine the biological effectiveness of insecticides after 5–10–15–20 days of disinfection, observations and calculations were carried out in the experimental and control variants.

The highest biological efficiency has been noted in the fifth day after disinfection. While a quantity of the larva under the variant of the disinfection with Mostar 20 SP insecticide (0.06 kg/ha) was 0–2 numbers for the 5th day, this index under the control variant was 18–27 numbers, the biological efficiency of preparation was 88.8–100%. A quantity of the larva under the variant of disinfection with Mosetam preparation (0.06 kg/ha) was noted 1–3 numbers, but under the control variant 18–27 numbers and the biological efficiency of the preparation was 83.3–95.8 %. The biological efficiency was 94.4–100 % in splashing with the Ramplan preparation (0.06 kg/ha), Cypersan insecticide (0.4 l/ha) showed 83.3–91.6 % biological efficiency (Fig. 3). The biological efficiency of Decis insecticide (0.4 I/ha) was 83.3–91.6 %, Bulldog preparation (0.5 l/ha) correspondingly was 88.8–100 %, Calypso (1.81/ha) – 94.4–100 %, Cartoon M preparation (1.5 I/ha) - 83.3–95.8 % and so on. The biological efficiency of standard variant (Karate Zeon (0.1 l/ha)) was 83.3–91.6%.

As it is seen from Table 3 that an impact period of the preparations gradually decreases over the days. Therefore, the economical injury limit must be noticed while fixing a fight time. Otherwise, the control must be necessary against one generation several times. Researches have shown that to prevent the development of pesticide resistance in the Colorado potato beetle, it is desirable to use alternating preparations of pyrethroid origin and other methods of control (Mammadova and Huseynov, 2012).

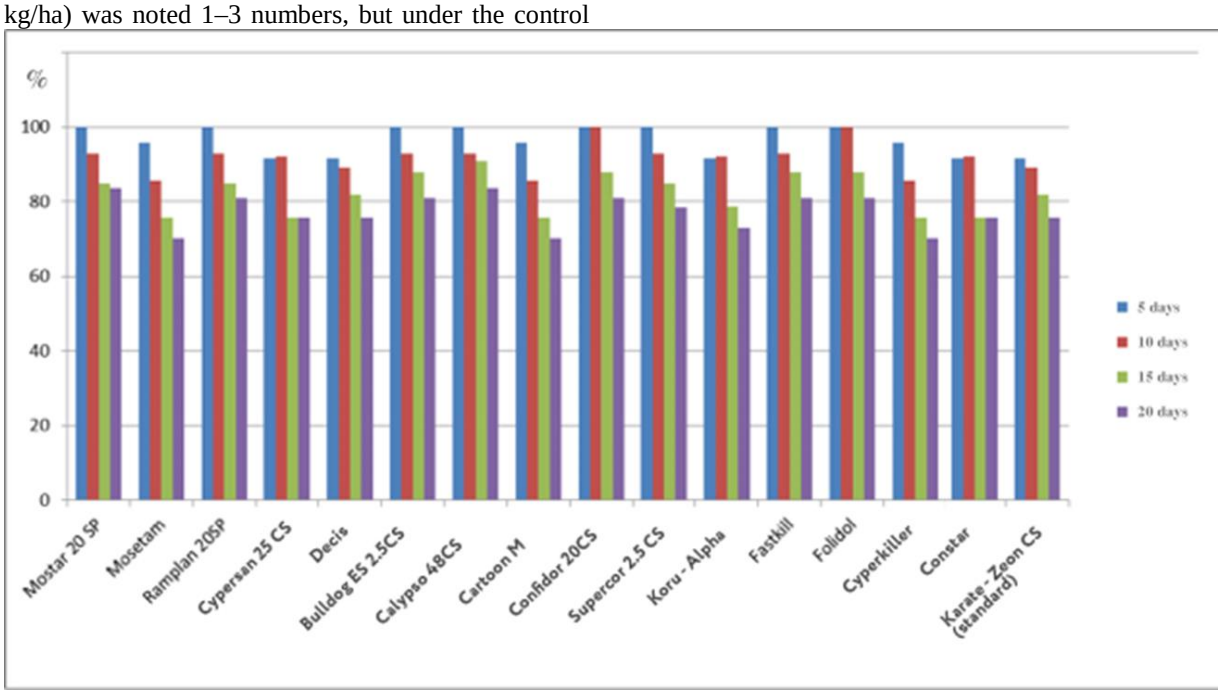


Fig. 3. Biological efficiency of preparations against L. decemlineata.

3.2.Biological control measures against L. decemlineata

The integrated use of biological control agents in integrated pest control measures for agricultural plants increases the economic rationality and agricultural value of these agents. On the other hand, biological agents prevent the pollution of the environment and the product with pesticides and ensure the maintenance of the ecological balance in the environment.

During the research years the protective strips and microbiological preparations (Bitoxybacillin (BTB), Boverin) have been tested. For the application of protective strips, attractive plants were chosen first. Research has shown that *L. decemlineata* feeds more on eggplants and potatoes than on cultivated and wild plants belonging to the *Solanaseae* family, they aren't interested in other plants. Therefore the eggplant was used as a protective strip for potato agrocenosis. One of the reasons the eggplant is used as a protective strip is because it has a long growing season. So, the stripe being sown in the early spring can be used both in early and in the summer tillage, as well as in the spring tillage. For this, experiments were carried out in two versions and four repetitions on planting potatoes in private farms of Sabirkend village of the Shamkir district. In the first variant, early planting of eggplants (second decade of March, planting seedlings under a shelter) was carried out along the edges of the field. The second option was the control one. In the first case, measures to combat the Colorado potato beetle were carried out using eggplants. In the second variant, control measures were carried out directly on potato crops (Table 4).

Table 3

Chemical control of the *L. decemlineata* over the generations (2014 – 2022)

Variants	Name of the preparation	Expense norm of the preparation	The number of the pests after disinfection (in 100 plants)				Biological efficiency of the preparation,%				The number of the pests after disinfection (in 100 plants)				Biological efficiency of the preparation,%				The number of the pests after disinfection (in 100 plants)				Biological efficiency of the preparation.%			
			Over days				Over days				Over days				Over days				Over days				Over days			
			5	10	15	20	5	10	15	20	5	10	15	20	5	10	15	20	5	10	15	20	5	10	15	20
I	Mostar 20 SP	0.06 kq/ha	2	3	4	7	88.8	85.7	84.6	77.4	0	2	5	6	100	92.8	84.8	83.7	0	3	6	7	100	91.4	85.3	84.0
II	Mosetam	0.06 kq/ha	3	5	7	9	83.3	76.1	73.0	70.9	1	4	8	11	95.8	85.7	75.7	70.2	2	4	7	9	92.5	88.5	82.9	79.5
III	Ramplan 20 SP	0.06 kq/ha	1	3	4	6	94.4	85.7	84.6	80.6	0	2	5	7	100	92.8	84.8	81.0	0	3	6	8	100	91.4	85.3	81.8
IV	Cypersan 25 CS	0.4 l/ha	3	4	6	11	83.3	80.9	76.9	64.5	2	5	8	9	91.6	92.1	75.7	75.6	3	5	8	10	88.8	85.7	80.4	77.2
V	Decis	0.4 l/ha	3	6	8	11	83.3	71.4	69.2	64.5	2	3	6	9	91.6	89.2	81.8	75.6	3	5	6	8	88.8	85.7	85.3	81.8
VI	Bulldog ES 2.5 CS	0.5 l/ha	2	3	5	6	88.8	85.7	80.7	80.6	0	2	4	7	100	92.8	87.8	81.0	0	3	5	9	100	91.4	87.8	79.5
VII	Calypso 48 CS	1.8 l/ha	1	2	4	6	94.4	90.4	84.6	80.6	0	2	3	6	100	92.8	90.9	83.7	0	3	6	8	100	91.4	85.3	81.8
VIII	Cartoon M	1.5 l/ha	3	5	7	9	83.3	76.1	73.0	70.9	1	4	8	11	95.8	85.7	75.7	70.2	2	4	7	9	92.5	88.5	82.9	79.5
IX	Confidor 20 CS	0.7 l/ha	0	2	3	5	100	90.4	88.4	83.8	0	0	4	7	100	100	87.8	81.0	0	2	3	7	100	94.2	92.6	84.0
X	Supercor 2.5 CS	0.2 l/ha	2	3	5	7	88.8	85.7	80.7	77.4	0	2	5	8	100	92.8	84.8	78.3	1	4	7	9	96.2	88.5	82.9	79.5
XI	Koru-Alpha	0.03 l/ha	2	4	7	10	88.8	80.9	73.0	67.7	2	5	7	10	91.6	92.1	78.7	72.9	3	6	8	9	88.8	82.5	80.4	79.5
XII	Fastkill	0.4 l/ha	2	3	5	6	88.8	85.7	80.7	80.6	0	2	4	7	100	92.8	87.8	81.0	0	3	5	9	100	91.4	87.8	79.5
XIII	Folidol	1.0 l/ha	0	2	3	5	100	90.4	88.4	83.8	0	0	4	7	100	100	87.8	81.0	0	2	3	7	100	94.2	92.6	84.0
XIV	Cyperkiller	0.4 l/ha	3	5	7	9	83.3	76.1	73.0	70.9	1	4	8	11	95.8	85.7	75.7	70.2	2	4	7	9	92.5	88.5	82.9	79.5
XV	Constar	0.4 l/ha	3	4	6	11	83.3	80.9	76.9	64.5	2	5	8	9	91.6	92.1	75.7	75.6	3	5	8	10	88.8	85.7	80.4	77.2
XVI	Karate Zeon CS (standard)	0.1 l/ha	3	6	8	11	83.3	71.4	69.2	64.5	2	3	6	9	91.6	89.2	81.8	75.6	3	5	6	8	88.8	85.7	85.3	81.8
XVII	Control	–	18	21	26	31	–	–	–	–	24	28	33	37	–	–	–	–	27	35	41	44	–	–	–	–

The carried out investigations showed that the use of protective strips, along with maintaining an ecological balance and growing organic products, also increases productivity. This was due to the fact that in the sprayed variant (control) the plants were stressed by the sprayed working solution and growth was inhibited. One of the advantages of using protective strips is that it reduces the pesticide load of the pests in invasion years and does not accumulate toxic residues in the product.

Table 4

Application of the protective strip against *L. decemlineata* in the early plantings.

Variants	Name of the preparation	Expense norms, kg/ha	Number of the pests after disinfection, number				Biological efficiency of the preparation, %				Productivity,t/ha	Quantity of the toxic residue	
			5	10	15	20	5	10	15	20		10	20
Experiment	-	-	-	-	-	-	-	-	-	-	38.0	-	-
Control	Ramplan	0.06	1	3	4	6	94.4	85.7	84.6	80.6	36.8	0.31	-

The microbiological preparations were tested against *L. decemlineata* during the research years. The microbiological preparations have some superiorities in comparison with the pesticides.

Studies have shown that biopreparations are selective, do not influence on entomophages and pollinating insects, and are not resistant to pests. These preparations are not dangerous for warm-blooded animals and humans and do not have a phytocidal (phytotoxic) effect on agricultural crops (Agansonova et al, 2011; Butov and Boeva, 2013). Microbiological preparations can be used at any stage of plant development, and the waiting period is short.

Bitoxybacillin (Bacillus thuringiensis, var.thuringiensis), exotoxin (crystal spore mass, dust like, BA–1500 EA/mg. Russian Federation) and Boverin (Beauveria bassiana, strain TC 92, fungal blastospores, titer 2 billion spores / gram, Russian Federation) microbiological preparations were tested against *L. decemlineata* in the early plantings in 2014–2018. For this purpose, 0.5; 1.0; 1.5 % solutions of BTB and Boverin were prepared and experiments were performed in five variants and four repetitions. Under the standard variant the Karate Zeon preparation (0.1 l/ha) was used (Table 5).

Table 5

Biological efficiency of the microbiological preparations against *L. decemlineata* larva in the early sowings.

Name of the preparation	Variants	Filthiness of the preparation, %	Number of the pests after disinfection, number			Biological efficiency of the preparation, %		
			5	10	15	5	10	15
BTB	I	0.5	8	9	10	-	10	16
BTB	II	1.0	5	4	8	37.5	60	33
BTB	III	1.5	5	4	6	37.5	60	50
Boverin	IV	0.5	8	10	11	-	-	8
Boverin	V	1.0	7	5	8	12	50	33
Boverin	VI	1.5	6	5	7	25	50	41.6
Karate Zeon	VII	0.1 l / ha	1	2	4	87.5	80	66.6
Control	VIII	-	8	10	12	-	-	-

As can be seen from the table 5, 1.0 and 1.5% BTB solution showed 60% biological effectiveness ten days after spraying. But in potato plantings sprayed with 1.0 and 1.5% solution of the microbiological preparation Boverin 10 days after spraying found 50% biological effectiveness. In the control variant (Karate Zeon), the biological efficiency on the fifth day was 87.5%. No phytocidal properties were found in the doses used.

4. Conclusion

Studies have shown that in mountainous areas it is advisable to grow early-maturing potato varieties in fallow and spring crops, as well as mid-early and mid-late potato varieties in spring sowing. Agrocenoses growing late-ripening potato varieties in mountainous areas were more susceptible to the negative impact of environmental factors, which increased yield losses and the cost of the product. To control *L. decemlineata* larva, we used integrated control methods, which include chemical and biological measures. From chemical methods, optimal doses of preparations were tested and determined, such as Mostar 20 SP (0.02; 0.04; 0.06 kg/ha), Mosetam 20 SP (0.02; 0.04; 0.06 kg/ha), Ramplan 20 SP (0.02; 0.04; 0.06 kg/ha), Cypersan 25 CS (0.2; 0.4; 0.6 1/ha) and others. From biological preparations were used 0.5; 1.0; 1.5% solution of Bitoxybacillin and Boverin, which showed biological effectiveness of 60 and 50%, respectively. Minimizing the amount of disinfection in an integrated pest control of potato plants had a positive impact on environmental protection. The preparations used against the Colorado potato beetle, in the indicated doses, had high biological effectiveness, did not have any phytotoxic effect on plants, and no toxic residues were found during harvesting.

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BIOLOGICAL SCIENCES

ANALYSIS OF PREGNANT MICE IN CHRONIC ALCOHOL INTOXICATION

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Abstract
The article discusses the inhumanity of alcohol and other experiments on pregnant mice in biological education. Use of "indicator" animals with known microbiological status. Animals are placed in the same environment as the population being tested and periodically sacrificed and examined. Naked (athymic) mice are excellent indicators because they are immunodeficient and especially susceptible to pathogens. But these mice are not suitable for detecting changes in serological titer, which may indicate the presence of viruses, since there is no antigenic response in nude mice. To determine the serological titer, it is necessary to use animals with the appropriate immune status.

Keywords: pregnant mice, experience, humanism, blood test, alcoholism, ethyl alcohol

Introduction. The World Health Organization has identified six criteria for diagnosing alcohol dependence. The main and first criterion is a person's inability to control alcohol intake. According to the second criterion, a person feels the urge to drink. This desire can manifest itself both openly and under the pretext of relieving tension and relaxation. As a result of this desire, a person forgets his family, laws and norms of social behavior. The third symptom is that the body easily "tolerates" alcohol. If a person drinks three glasses of vodka and brags that he is not drunk, it is a dangerous syndrome. The problem is that the body tries to process ethyl alcohol into the bloodstream to the best of its ability. But sooner or later the final stage is reached and the mechanism is broken. As a result, alcohol causes mental weakness. That is, the person can greet you and forget about it after a few seconds.

The fourth symptom is abstinence syndrome. This means that a person feels tired, depressed, and his hands swell the day after drinking. Such people look forward to the end of the working day to drink again, even if they do not drink early in the morning. However, those who feel unwell after drinking are also divided into two groups, and those who are poisoned by alcohol can not be considered alcoholics. They simply feel bad the next day because they have been poisoned and do not want to drink again to improve their condition. Alcoholics, on the other hand, feel the need to drink again. However, alcohol poisoning is also directly related to the culture of alcohol consumption. If a person drinks two bottles of vodka, he receives 400 milliliters of ethyl alcohol. This is a lethal dose for a person weighing 70 kilograms. The average person is resuscitated with this dose. This does not happen in alcoholics. Therefore, for drinkers, alcoholism and heroism are synonymous. The fifth symptom is various diseases. That is, a person's laboratory tests are negative or his family breaks up as a result of drinking. He can't stop drinking and can't stop drinking alcohol. The last criterion is that alcohol plays a key role in human life. In other words, according to this criterion, a person's life and personal life are built around alcohol. Other non-alcoholic interests take second place.

Alcohol is one of the drinks that contains ethyl alcohol, and when drunk, it gives a person temporary pleasure and intoxication, as well as a harmful effect on the body, which has become a habit in many people. Those who are unable to abstain from alcohol are called alcoholics if they consume alcohol to the extent that it impairs their physical and mental health, family, social, and work life. Alcoholism is a disease that occurs as a result of regular consumption of alcohol and is addictive. This disease negatively affects a person's reputation by causing physical and mental disorders. Alcohol is mainly toxic to brain cells. A drunk person celebrates for the first moments, enjoys himself and so on. but as the effects of alcohol increase, all of this can be replaced by irritability, obscenity, irritability, and rudeness. Alcoholism causes dystrophic changes in the vascular system, the development of hypertension, serous liver, impaired renal function, as well as profound mental and somatic disorders. The disease results in mental retardation, alcoholic epilepsy, and sometimes alcohol psychosis. The patient is frightened, sleep is disturbed, hallucinations are observed. Accidents often occur among alcoholics, their ability to work is weakened. Alcoholism has a negative effect on the female psyche. Alcohol consumption during pregnancy is especially unacceptable. Thus, the alcohol consumed in this case has a very negative impact not only on the mother's body, but also on the health of the unborn child. It is more common for women with alcoholism to give birth to children with physical or mental disabilities.

Unfortunately, both in education and in science, have to experiment on animals in order to treat alcoholism and measure the scale of harm in general. Acute alcohol toxicity should be studied in several animal species, and it is imperative to use the species in which the therapeutic effect of the pharmacological substance has been shown and in which long-term toxicity was studied. Usually 2-3 species of rodents and non-rodents (mice, rats.) are used. Groups of male and female experimental animals are formed separately. For small rodents, each group should contain at least 5-6 females and the same number of males.

An experiment carried out on several lines often shows different susceptibility of the lines. The assessment of nanosafety should be based on the most sensitive line, but in some cases it is necessary to find the gene for such susceptibility. This will help clarify mechanism of nanotoxicity and obtain data for innovative drugs in the future. Unfortunately, toxicologists have never attempted such a design. If mice are used instead of rats, then more radical changes will be needed. According to foreign data, it was mice (91.4%) that were the most commonly used species for gene modification, and only then were rats (3.6%), zebrafish (2.3%), and other species, including chickens, sheep and cows (1.3%). The most frequently used for gene modification of mouse lines C57BL/6 (48.1%), 129Sv (11.1%), Balb/c (4.3%), CD1 (2.5%) and FVB (0.3%). The advantage in using mice is the wide availability of different strains and an extensive database of mouse genetics, mouse/human gene matching, and the relative ease of mouse genetic manipulation. Genetic modifications may include the "insertion" of the necessary gene that gives a response to nanosubstances.

The similarity constants show how many times faster (or slower) intoxication can develop in an animal compared to humans due to a higher (or lower) intensity of biological processes and, according to our calculations, if a person is taken as a unit: for a mouse ~9.7, rats ~5.2, guinea pig, ~4.3, rabbit, ~2.5, dogs, ~1.7, sheep, ~1.4, pigs, ~0.83 and horses~0.75.

When switching to real time, this means that, for example, intoxication or an adverse drug reaction that develops in a rat in 3 months will manifest itself in a mouse after 1.5 months, in a rabbit - after 6 months, in a dog - after 1 month, in humans - 16 months, and in the horse only after 22 months of exposure to the substance. The existence of allometric dependencies of time for the development of the effects of intoxication is necessary take into account when assessing the adequacy of the duration of pharmacological and toxicological experiments when extrapolating data from animals to humans.

Genetic analysis has shown that the number of newly acquired genes per neuron in the human brain is greater than in the chimpanzee brain. In addition, the adult human brain contains significantly more copies of mobile genetic L1 elements than the liver and heart, which is due to the adaptation of the nervous system to the constantly changing environment and the individual's lifelong learning. In 2006, it was found that the human genome contains 212 copies of the MGC8902 gene, which is expressed only in brain neurons and encodes the DUF1220 protein with unknown functions. At the same time, in the genome only 37 copies of this gene were found in chimpanzees, and one copy each in mouse and rat genomes. Hence, it was suggested that the MGC8902 gene may be involved in evolutionary changes in the brain. It is also assumed that the formation of a more complex neural network and, accordingly, a more complex structure of the human brain is responsible for the so-called extended transcription of the human genome. About 20% of brain neurons normally regenerate, while at the same time, with age, up to 30 g of neurons are irretrievably lost every year.

It has been established that mice infected with toxoplasmosis “run badly” from cats and, most importantly, the parasite is transmitted to cats with great success. It is also believed that toxoplasmas "redistribute" and affect the psyche of the infected person. This is one of them examples of an amazing biological phenomenon when a parasite can be managed by a host.

In real time it has not been possible to create yet human hybrids and to obtain therapeutic antibodies are used only mouse hybrids. Imaging monoclonal antibodies represent their own powerful immunogens, which are formed in the body of patients with HAMA (from the English "human anti-mouse antibodies" -

antimyshynye antibodies of man). To reduce the immunogenicity of such antibodies are carried out with the help of different and sufficiently labor-intensive ways of their "embodiment", transferring mouse sites, determining complementarity (CDR, from English. "Complementarity determiniges" regions). Protein NR2B was found that the process of training and blood pressure are regulated by one and the same biochemical mechanism, in particular, with the participation of protein NR2B. This protein has a beneficial effect on the process of memory and training in mice. Transgenic mice with an additional copy of the NR2B protein gene instantly learned the details of the LEGO designer. This line of mice was called "Arc", in honor of the hero of the TV series "Arc Hauser - Doctor of Medicine." It is assumed that the transfer of the gene NR2B protein in human offspring will allow to create the future "wunderkinds to order". However, the addition of "smart protein" sharply increases the likelihood of stroke in the carrier of an additional copy of the gene.

In view of all this, scientists are studying the effects of alcoholism on pregnancy through various experiments. As mentioned earlier, mice, the gene closest to the human gene, are used for this purpose. Scientists keep pregnant mice in a cotton cell impregnated with ethyl alcohol and its derivatives. Some even drink ethyl alcohol to pregnant mice. Blood tests and other tests of these pregnant mice are then performed.

Let's clarify right away: the main component of any alcoholic beverage is ethyl alcohol (or ethanol). It is he who is responsible for all the changes that occur to our body after drinking alcohol. After swallowing, ethyl alcohol enters the stomach, where approximately 20% of its volume is absorbed into the blood. Most (80%) a little later enters the bloodstream already from the intestines. Once in the blood, ethanol begins to act on the body. The fact is that ethyl alcohol has a different effect on different types of nerve cells, upsetting the balance of the processes of excitation and inhibition.

All alcoholic products necessarily contain ethyl alcohol. For example, what is beer? 100 grams of beer is 6-12 grams of poison (ethyl alcohol), “dressed” in hops, rye, yeast and other ingredients.

What is wine? 100 g of wine is 20 g of poison (ethyl alcohol), “dressed” in grape, apple and other must (juices). Different varieties of grapes, apples - these are different varieties of wine, but the main component of them is poison - ethyl alcohol, one for all. 100 g of champagne is 17 g of poison, and the rest is various extracts.

What is vodka? 100 g of vodka is 40 g of poison (ethyl alcohol) "dressed" in 60 g of water and various extracts.

What is cognac? 100 g of cognac is 40 g of poison, "dressed" in color, which is drawn from an oak tree and 60 g of water and various extracts.

What is moonshine? 100 g of moonshine is from 20 to 70 g of poison, "dressed" in water and fusel oils.

Once in the body of a mouse, ethyl alcohol is absorbed through the walls of the stomach and intestines, quickly reaches the liver and appears in the blood. The state of intoxication depends on the concentration of alcohol in the blood. The content of alcohol in the blood up to 0.5 g / l usually does not cause immediately noticeable changes. At an alcohol concentration of 0.5-1 g / l, there is no noticeable intoxication observed, but the nerve centers cease to function normally. This is a very dangerous condition, especially for car drivers. As a result of numerous medical examinations, the probability of accidents in this case increases 14 times. With the accumulation of 2 g / l in the blood, the degree of intoxication increases: the gait becomes unsteady.

In the biochemistry of ethanol, an important role is played by the fact that it forms solutions in a wide range of proportions with both water and fats. It is a by-product of glucose metabolism; the blood of a healthy mouse can contain up to 0.01% of endogenous ethanol, which is a metabolic product. When ingested, ethanol has a narcotic and toxic effect, depending on the dose, concentration, route of entry into the body and duration of exposure, its effect varies. Any dose of alcohol harms the body, there is no safe dose. Under the narcotic effect, its ability to cause coma, stupor, insensitivity to pain, depression of the central nervous system, alcoholic arousal, addiction, as well as its anesthetic effect is indicated. Under the influence of ethanol, endorphins are released in the nucleus accumbens (Nucleus accumbens). In certain doses to body weight and concentrations leads to acute poisoning and death (lethal single dose - 4-12 grams of ethanol per kilogram of body weight).

The main metabolite of ethanol, acetaldehyde, is toxic, mutagenic, and possibly carcinogenic. There is evidence for the carcinogenicity of acetaldehyde in animal experiments; in addition, acetaldehyde damages DNA.

Long-term use of ethanol can cause diseases such as cirrhosis of the liver, gastritis, necrotizing pancreatitis, gastric ulcer, breast cancer, stomach cancer and cancer of the esophagus (that is, it is a carcinogen), hemolytic anemia, arterial hypertension, stroke, cause sudden death of people suffering from ischemic heart disease; can cause serious metabolic disorders. Alcohol may increase the risk of having a child with congenital anomalies of the nervous system and cause growth retardation. The use of ethanol can cause oxidative damage to brain neurons, as well as their death due to damage to the blood-brain barrier. Alcohol abuse in mice can lead to clinical depression and alcoholism. The intake of alcoholic beverages while taking medication is highly undesirable, since alcohol perverts the effect of drugs and, as a result, becomes dangerous for the life of the mouse.

The negative effect of alcoholic beverages on the results of pharmacotherapy is diverse and depends on various factors: the individual characteristics of the patient, his sensitivity, the severity of the disease, but in all cases, in patients taking drugs and consuming alcohol, the effectiveness of pharmacotherapy is weakened, and sometimes even reduced to nothing. Ethanol can be synthesized in small amounts in the lumen of the gastrointestinal tract as a result of the fermentation of carbohydrate foods by microorganisms (conditional endogenous alcohol).

The existence of biochemical reactions with the synthesis of ethanol in the tissues of the mouse body (true endogenous alcohol) is considered possible, but has not been proven to date. The amount of endogenous alcohol rarely exceeds 0.18 ppm, which is on the border of sensitivity of the most modern devices. An ordinary breathalyzer cannot determine such quantities.

Ethanol can also be harmful to health when inhaled vapors at sufficiently high concentrations. Mutagens can be various factors that cause changes in the structure of genes, the structure and number of chromosomes. By origin, mutagens are classified into endogenous, formed during the life of the organism and exogenous - all other factors, including environmental conditions.

Chemical mutagens are the most common in the group. These include the following groups of compounds:

-some alkaloids: colchicine - one of the most common mutagens in breeding, vincamine, podophyllotoxin;

-oxidizing and reducing agents (nitrates, nitrous acid and its salts - nitrites, reactive oxygen species);

-alkylating agents (eg, iodoacetamide, epoxybenzanthracene);

nitro derivatives of urea: nitrosomethylurea, nitrosoethylurea, nitrosodimethylurea - often used in agriculture;

-ethyleneimine, ethyl methanesulfonate, dimethyl sulfate, 1,4-bisdiazoacetylbutane (known as DAB);

-some pesticides (pesticides of the aldrin group, hexachloran);

-some food additives (for example, aromatic hydrocarbons (benzene, etc.), cyclamates);

-oil refining products;

-organic solvents;

-drugs (eg, cytostatics, mercury preparations, immunosuppressants).

A number of viruses can also be conditionally classified as chemical mutagens (the mutagenic factor of viruses is their nucleic acids - DNA or RNA).

The mechanism of action is based on the formation of so-called DNA adducts with nucleic bases. The more such DNA adducts are formed in a molecule, the more the native structure of DNA changes, which leads to the impossibility of the correct course of protein biosynthesis processes (transcription and replication) and thereby generates the expression of mutant proteins. Almost all chemical mutagens are sources of

malignant tumors (they are carcinogenic), but not all carcinogens exhibit mutagenic properties.

The mechanism of action is based on the formation of so-called DNA adducts with nucleic bases. The more such DNA adducts are formed in a molecule, the more the native structure of DNA changes, which leads to the impossibility of the correct course of protein biosynthesis processes (transcription and replication) and thereby generates the expression of mutant proteins. Almost all chemical mutagens are sources of malignant tumors (they are carcinogenic), but not all carcinogens exhibit mutagenic properties.

Let us consider the mechanism of action of one of the mutagens, benzene epoxide.

By itself, benzene does not have mutagenic activity; is a promutagen. However, as a result of biological oxidation and biotransformation in the cells of the liver, kidneys, and especially in the myeloid tissue of the red bone marrow, it acquires mutagenic properties. Once in the hepatocyte, benzene is immediately hydroxylated by the microsomal oxidation system catalyzed by a group of enzymes of the cytochrome P450 family to epoxide. Benzene epoxide is extremely reactive due to the formation of a strained cycle between the oxygen atom and the benzene molecule. It is able to very quickly alkylate nucleic acid molecules, in particular DNA. The mechanism for the formation of a DNA adduct with benzene epoxide is the reaction of nucleophilic substitution of SN2: an electrophile - in this case, it is an epoxide (due to ring breaking, it becomes electron-deficient), - which interacts with nucleophilic centers - NH2 groups (which are electron-rich) of nitrogenous bases, - forming covalent bonds with them (often very strong). This alkylation property is especially manifested in guanine, since its molecule contains the most nucleophilic centers, with the formation, for example, of N7-phenylguanine. The resulting DNA adduct can lead to a change in the DNA structure, thereby disrupting the proper course of transcription and replication processes, which is the source of genetic mutations. The accumulation of epoxide in liver cells leads to irreversible consequences: an increase in DNA alkylation, and at the same time an increase in the expression of mutant proteins that are products of a genetic mutation; inhibition of apoptosis; transformation and even cell death. In addition to pronounced pronounced genotoxicity and mutagenicity, it also has strong carcinogenic activity, especially this effect is manifested in the cells of myeloid tissue (the cells of this tissue are very sensitive to this kind of xenobiotic effects).

Congenital malformations, primarily spina bifida, increased in oral doses of 150-250 mg / kg / day (approximately 1-2 times the recommended maximum human dose based on body surface comparison) in offspring of pregnant rats given ethyl alcohol during organogenesis. In the fetuses of pregnant mice treated at a dose of 50-200 mg / kg, the cleft palate was increased depending on the dose (approximately 0.2 to 0.8 times the maximum recommended human dose based on a comparison of body surface area). Incomplete osteogenesis and embryotoxicity have also been reported in pregnant rabbits at doses up to 200 mg / kg of ethyl alcohol per day (approximately 3 times the recommended daily human dose based on body surface area comparison). Although there is no adequate and well-controlled study in pregnant women, rifampin has been reported to cross the placental barrier and appear in cord blood.

Oral administration of ethyl alcohol to both rats and rabbits during pregnancy has been reported to have embryocidal effects, although reproductive studies in mammalian species (mice, rats, and rabbits) have not revealed congenital anomalies associated with ethyl alcohol.

Strain mice are more sensitive than, and the degree of testicular weight loss is stronger than in hybrid animals. An analysis of these indicators revealed that on days 30 and 45 after administration of ethyl alcohol, the weight of the testicles was slightly higher in the variants with the introduction of NNP. In both periods of the analysis, the frequency of was lower in the case of the introduction of the drug. When summing up the results of the analysis on days 30 and 45 after administration of ethyl alcohol.

Table 7 presents the results of the analysis of embryonic mortality in the offspring of males who received a total dose of 3 Gy, fractionated by 0.6 Gy for 5 days, which were administered after ethyl alcohol with a minimum dose of RNP 4 mg/kg for 10 days. Within 4-6 weeks after the administration of ethyl alcohol, the fertility of males in the control decreased significantly up to complete sterility. Analysis of the results as early as the 3rd week of mating revealed a positive effect of RNP on the mortality rate of embryos before the implantation period. Summing up the results of the study of the genetic action of RNP, it should be noted that in all the experiments carried out, there was a tendency towards a therapeutic effect of RNP. A statistically significant decrease in the degree of alcohol damage in terms of the percentage of effective crossings was found with the introduction of NNP (10 mg/kg) five times, after the administration of ethyl alcohol at a dose of 3 Gy of gray hybrids CBAxC57BX F1. In addition, a decrease in the frequency of AGS was found in BALB mice in a similar variant of the experiment. Three similar experiments were carried out (3 Gy + 10 mg/kg RNP × 5) on mice of three different genotypes (gray hybrids, white hybrids and BALB strain mice). The therapeutic effect was most pronounced in BALB mice. A positive effect in hybrid mice was found only in experiments on old animals. This suggests that the beneficial effect of NNP is associated with the stimulation of the cellular repair system, which may be weakened in linear and old mice. In general, the beneficial effect is most pronounced at a relatively high dose of alcohol.

The mouse genome contains the same number of genes as the human genome, with 99% of these genes appearing to be identical and 96% in the same order. This means that disease genes identified in mice can be transferred to the human gene map. You can conduct experimental crosses between mice with different traits, and then very quickly begin to study the resulting offspring.

In view of all this, at least we should pay attention to their living conditions and good nutrition. We must follow safety rules in accordance with the norms.

The territory on which the building of biomedical research is located must be fenced and protected from external access. The order of entry into the territory is strictly defined. carry out weaning of young animals from the uterus at the end of the suckling period (mice, rats - 28-31 days; hamsters - 21-29 days; guinea pigs - 27-29 days; miniature pigs - 45 days) and form groups of according to sex.

In the laboratory building, rats and mice are kept in cages in direct contact with the bedding. As bedding, it is recommended to use sawdust, shavings or small chips (length 5–20 mm, thickness 1–2 mm) from environmentally friendly hardwood. It is not allowed to use bedding made of chemically treated wood, as well as softwood. The bedding is autoclaved on trays at 118°C for 30 minutes. Bedding paper is stored and cut in a special auxiliary room. The required amount of bedding enters the housing in cut form in closed plastic bags. The closed bags are stored in the feed and litter storage room. Sanitization of the room is carried out in accordance with the "Plan of sanitary measures in the storage room for food and bedding". The control of the presence of parasites in the litter is carried out by a specialized state enterprise of the system of the sanitary and epidemiological service under a contract for disinfection work.

Methods: experimental, empirical, theoretical, comparative.

Result. In the end, not to mention that all the research proved that the mouse genome contains the same number of genes as the human genome, with 99% of these genes appearing to be identical and 96% in the same order. This means that disease genes identified in mice can be transferred to the human gene map. You can conduct experimental crosses between mice with different traits, and then very quickly begin to study the resulting offspring. It is possible to obtain mutant mice with certain gene defects, the phenotype of which can then be studied. In view of all this, at least we should pay attention to their living conditions and good nutrition. We must follow safety rules in accordance with the norms.

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JURISPRUDENCE

THE ESSENCE OF THE PROPERTY TAX AND ITS FEATURES UNDER THE LEGISLATION OF THE REPUBLIC OF UZBEKISTAN

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СУЩНОСТЬ НАЛОГА НА ИМУЩЕСТВО И ЕГО ОСОБЕННОСТИ ПО ЗАКОНОДАТЕЛЬСТВУ РЕСПУБЛИКИ УЗБЕКИСТАН

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Abstract

Based on a comparative analysis of theoretical views on the essence of the property tax, the article focuses on its features under the legislation of the Republic of Uzbekistan. It's justified that it is necessary to abandon the broad interpretation of the tax in question and the set of terms used in this case. The characteristic features of the property tax that distinguish it from other types of taxes are identified, which are most clearly manifested in the criteria for classifying property taxes of legal entities and individuals under the budget and tax legislation of the Republic of Uzbekistan.

Аннотация

В статье на основе сравнительного анализа теоретических воззрений по вопросу о сущности налога на имущество акцентируется внимание на его особенностях по законодательству Республики Узбекистан. Обосновывается вывод о необходимости отказа от широкой трактовки рассматриваемого налога и множества терминов, применяемых при этом. Обозначены характерные признаки налога на имущество, отличающие его от иных видов налогов, которые наиболее отчетливо проявляются в критериях классификации налогов на имущество юридических лиц и физических лиц по бюджетному и налоговому законодательству Республики Узбекистан.

Keywords: property tax, property taxes, tax classification, property of legal entities, property of individuals, budget legislation, Tax Code.

Ключевые слова: налог на имущество, имущественные налоги, классификация налогов, имущество юридических лиц, имущество физических лиц, бюджетное законодательство, Налоговый кодекс.

В литературе часто встречаются упоминания о «налогах на имущество» [1], «имущественных налогах» [2], «налогах с имущества» [3]. Все рассуждения теоретиков, связанные с налогообложением имущества лишены единого подхода, определяющего, что подразумевают ученые под тем или иным термином. Поэтому выяснение данного вопроса имеет важное теоретическое значение.

Прежде всего, следует заметить, что используемое в научной литературе и налоговом законодательстве понятие «имущественные налоги» является по существу собирательным, поскольку имущественные налоги - это целый конгломерат налогов. К их числу, например, относят земельный налог, налог на имущество предприятий, налог на имущество физических лиц, налог на операции с ценными бумагами и некоторые другие налоги в части обложения прироста стоимости имущества. Вместе с тем, как справедливо отмечалось в специальной литературе, имущественные налоги представляют собой, прежде всего налоги, объектом обложения которых является имущество само по себе, а не как источник дохода[4]. По нашему мнению, такой подход в отношении определения имущественных налогов является более продуктивным. Дело в том, что при определении сущности любого налога, всегда следует исходить из основных элементов закона о налоге, а также элементов налоговых правоотношений. Подобный подход позволяет отграничить сходные категории в налоговом праве, внести ясность в регулируемые общественные отношения.

С учетом отмеченного представляется более приемлемым из всех существующих терминов относительно налогообложения имущества, термин «налог на имущество», поскольку налог всегда

направлен на какой-либо объект, служащий основанием взимания налога (фактическим обстоятельством), с которым связана реализация обязанности по уплате налога. Следует заметить, что именно по этому пути идет и налоговое законодательство Узбекистана. Так, раздел XV Налогового кодекса Республики Узбекистан от 30 декабря 2019 года[5] называется «Налог на имущество».

Нередко в литературе можно встретить термин «налоги с имущества», который не раскрывает правовое содержание налоговых отношений, возникающих по поводу уплаты отдельных видов налогов на имущество, а указывает на источник налогообложения. Безусловно, налог, являясь обязательным платежом, всегда взимается с какого-либо источника. Несмотря на существующие утверждения о том, что имущество может являться источником обложения, на наш взгляд, более справедливым представляется мнение о том, что выбор источника налога строго ограничен, поскольку существует только два источника, за счет которых может быть уплачен налог - доход и капитал налогоплательщика[6].

Имущество выступало в качестве источника обложения только в условиях натурального хозяйства. В условиях неразвитого товарообмена имущество выступало в качестве основного источника обложения, поскольку доход мог быть выражен только в виде имущества. В этом случае доход и имущество представляли собой одно целое.

Итак, термин «налоги с имущества» вряд ли приемлем для использования в налоговом праве. Но он существует и не безосновательно, так как отражает в себе реальность определенных общественных отношений. Термин «поимущественные налоги» как бы подчеркивает, что объектом обложения является не само имущество, а доход от его использования. Не случайно поимущественные налоги также называют подоходно- поимущественными[7].

И, наконец, отграничивая широко используемые в понятийном аппарате налогового права термины «имущественные налоги» и «налоги на имущество», необходимо помнить, что все налоговые правоотношения являются властно-имущественными[8]. Все они направлены на отчуждение частной собственности[9], отображением которой является имущество.

Вместе с тем, понятие «налог на имущество» подчеркивает чистоту объекта обложения, под которым, как правило, понимается только имущество с присущими ему свойствами и особенностями. Так, в соответствии со ст. 411 Налогового кодекса Республики Узбекистан устанавливают, что объектом налога на имущество юридических лиц является недвижимое имущество, к которому относятся:

1) здания и сооружения, подлежащие регистрации в органах, осуществляющих государственную регистрацию прав на недвижимое имущество;

2) объекты незавершенного строительства (объекты, строительство которых не завершено в нормативный срок, установленный проектно-сметной документацией на строительство этого объекта, а в случае, если нормативный срок строительства не установлен, - в течение двадцати четырех месяцев начиная с месяца, в котором получено разрешение уполномоченного органа на строительство этого объекта;

3) железнодорожные пути, магистральные трубопроводы, линии связи и электропередач, а также сооружения, являющиеся неотъемлемой технологической частью указанных объектов;

4) объекты жилой недвижимости, числящиеся на балансе строительных организаций или застройщиков для последующей реализации, по истечении шести месяцев после ввода объекта недвижимости в эксплуатацию.

Согласно ст. 419 Налогового кодекса Республики Узбекистан объектом налогообложения налога на имущество физических лиц является имущество, находящееся на территории Республики Узбекистан, в том числе:

1) жилые дома, квартиры, дачные строения;

2) объекты недвижимого имущества нежилого назначения, предназначенные для предпринимательской деятельности и (или) извлечения дохода;

3) объекты незавершенного строительства нежилого назначения;

и т.д.

По нашему мнению, следует отказаться от широкой трактовки налога на имущество и множества терминов, применяемых при этом. Осуществляя налоговое регулирование, необходимо обеспечить единообразие и согласованность терминов и понятий в налоговых актах, ввести требуемый минимум экономической и правовой терминологии.

Итак, налог на имущество - это налог в собственном смысле слова, объектом обложения которого является имущество, а не его прирост, доход или что-то другое.

Специфика объекта налогообложения имущества, а также национальные традиции, направленность экономического регулирования позволяют говорить о том, что налогообложение имущества - это институт финансового права, объединяющий в своей совокупности нормы, направленные на урегулирование общественных отношений по установлению и взиманию налога на имущество юридических лиц и налога на имущество физических лиц.

Таким образом, налогообложение имущества и налог на имущество соотносятся как целое и часть. Если налогообложение имущества можно представить не только в материальном смысле, но и в процессуальном, включающем в себя этапы правотворчества и правореализации налоговых норм, то термин «налог на имущество» употребляется только в материальном смысле.

Налог на имущество обладает как общими для налогов характерными признаками, так и некоторыми особенностями, отличающими его от иных видов налогов. Эти особенности наиболее отчетливо проявляются в критериях классификации налогов. Дело в том, что единые по своей сущности налоги в зависимости от общих наиболее важных

признаков сходства и различия могут классифицироваться по нескольким критериям.

Во-первых, по методу (способу) взимания налогов выделяются прямые и косвенные налоги. По данному критерию налог на имущество относится к числу прямых налогов[10].

Существует множество концепций различия косвенных и прямых налогов. Например, представители одной из таких концепций утверждают, что различия косвенных и прямых налогов следует искать в условиях переложения налогового бремени на конечного потребителя. Другие считают, что прямые налоги взимаются посредством именных списков и кадастров, а косвенные налоги связаны только с продажными ценами.

Данные концепции построены скорее с экономической точки зрения, нежели с юридических позиций и направлены в большей мере на соотношение доходов налогоплательщика с потреблением товаров и их ценами. Имущество как специфический объект налогообложения здесь не учитывается. Более приемлемым представляется точка зрения, согласно которой налоги на имущество являются прямыми по причине несовпадения юридического и фактического плательщика[11]. Эта формула точно и лаконично подчеркивает особенность налога на имущество, выраженную в том, что он является прямым.

Здесь же следует заметить, что налог на имущество - это реальный налог (от английского слова «real» - «имущество»). На ранних этапах развития человечества налогообложение имущества производилось «по внешним признакам» и поэтому было «реальным». В настоящее время налог на имущество характеризуются как реальный с учетом устоев и традиций, существовавших ранее. Реальными налогами на имущество облагаются не действительный доход налогоплательщика, а предполагаемый средний доход, получаемый в данных экономических условиях. В этом отношении налог на имущество позволяет обложить тот или иной объект налогом, чего нельзя достигнуть посредством обложения другими видами налогов.

Во-вторых, по объему полномочий государственных органов по установлению, введению и отмене налогов, а также в зависимости от уровня бюджетной системы государства, куда поступают те или иные налоги выделяются общегосударственные и местные налоги. В ранее действовавшем Налоговом кодексе Республики Узбекистан от 25 декабря 2007 года[12] проводилось четкое разграничение общегосударственных и местных налогов. В частности к местным налогам относились налог на имущество, земельный налог, фиксированный налог по отдельным видам предпринимательской деятельности (ст. 23). В Налоговом кодексе Республики Узбекистан от 30 декабря 2019 г., вступившим в силу с 1 января 2020 г. такое разграничение не проводится.

Теперь же в соответствии с Бюджетным кодексом Республики Узбекистан от 26 декабря 2013 года[13] разграничение общегосударственных и местных налогов проводится в зависимости от уровня бюджетной системы государства, куда поступают те или иные налоги. Так, платежи по налогу на имущество юридических лиц и физических лиц в полном объеме зачисляются в местные бюджеты (ст. 12 Закона Республики Узбекистан о Государственном бюджете Республики Узбекистан на 2022 год [14]).

Отнесение налога на имущество к местным налогам, безусловно, имеет смысл, так как именно на региональном уровне организация взимания налога на имущество и контроль за его поступлением в бюджет может осуществляться более эффективно. Кроме того, информационная основа налогообложения имущества требуют постоянного обновления, так как постоянно возникают новые объекты (появляются новые здания, сооружения, меняются собственники и т.д.). Учет правового режима объектов налогообложения, его изменения, соответствующая переоценка стоимости объектов и решение многих других вопросов наиболее эффективно может осуществляться местными органами власти.

В-третьих, затрагивая субъектный состав налогообложения имущества, отметим, что плательщиками налогов на имущество выступают собственники облагаемого имущества - юридические и физические лица. Например, плательщиками налога на имущество юридических лиц являются: а) юридические лица - резиденты Республики Узбекистан, имеющие налогооблагаемое имущество на территории Республики Узбекистан; б) юридические лица - нерезиденты Республики Узбекистан, осуществляющие деятельность в Республике Узбекистан через постоянное учреждение и (или) имеющие в собственности недвижимое имущество на территории Республики Узбекистан. Плательщиками налогов на имущество физических лиц являются физические лица, имеющие в собственности налогооблагаемое имущество[15].

Иногда в специальной литературе выделяются и другие классификации налогов. Так, в зависимости от уровня бюджета, в который зачисляется налог, выделяются закрепленные и регулирующие налоги [16].

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SOCIAL SCIENCIES

FORMING PROFESSIONAL SOCIAL WORK IN THE CONTEXT OF POSTMODERNISM DISCOURSES: EVALUATION OF DYNAMICS FROM 1991 TO 2000

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Abstract
The article is devoted to the analysis of the formation of professional social work from the beginning of the 90s to 2000. The changes are connected with the processes of de-Sovietization of Russian society. Social protection in the 90s was implemented as a project of the new ruling elites in the discourses of postmodernism.

Keywords: social work, platform 1.0, postmodernism, postmodernization, clinical vector

A new stage in the formation of professional social work begins in the early 1990s, and it was associated with the processes of de-Sovietization of Russian society. The process of de-Sovietization was carried out in the logic of postmodernism, in the context of the processes of globalization, the destruction of "the traditional way of life, the chaos of financial markets and public goods"[29].

The American sociologist Z. Bauman, defining the essence of postmodernism in the life of society, from our point of view, quite accurately reflected its socio-psychological state, which is characteristic not only for Western civilization, but also for the Russian society of social transformations of the 90s: "... the period of postmodernism is carried out How is life during a crisis. Postmodern thinking is aware that there are problems in human life and society that have no good solutions; that there are only winding roads that cannot be straightened... that there are doubts that cannot be eliminated by legislation from existence; that there are moral sufferings which cannot be appeased by any arguments of reason"[26].

Comprehending the social and political reforms of the late twentieth century in Russia, it can be noted that the strategies in the discourses of postmodernism were implemented in various areas, and the characteristic features of these transformations were numerous projects that determined the essence of the transitive state of both social relations and social institutions [22].

Economic, political, and ideological uncertainty made its own adjustments to the management policy of the ruling elites at all levels, in all segments of the economy, including the emerging system of social protection.

Social protection in the 90s was implemented as a project of the new ruling elites in the discourses of postmodernism, in this context, social work developed in several directions simultaneously:

• professional activity, within the framework of the new state project of "social protection",

• the field of knowledge, in the paradigm of "projects of post-Marxist knowledge" in the narratives of the humanities,

• the direction of education as a project of "social education" in the context of the Bologna processes.

In this most complex crucible of various social, educational and professional projects, a "new image" of the national paradigm of social work was formed.

The system of social protection in the Russian Federation in the new socio-political conditions was formed in a situation of liberal reform, and there were simply no direct ways out of the "socialist paradise", as well as the entrance to it in the past, at this historical stage.

During this period, the ruling elites chose a course for the modernization of the economy, transferring it to the "market rails", which was connected with the course of privatization of state institutions and forms of ownership.

The modernization of the economy in the logic of postmodernism expanded the strategies of capital accumulation, and the "architects of modernization" were not limited only to privatizations of the production sector, minerals, modernization also covered the social sphere, its segments such as education and healthcare.

Social protection will be included in these processes later, and not because the processes of capitalization in Russia were implemented on the "humanistic principles of democratic capitalism", but because the process of marginalization has engulfed the entire Russian society, both the working population and pensioners and disabled people in the care of the state and dependent children who have been under his constant patronage for decades.

This aspect of economic reforms determined the specifics of both social security models and the practice of social work in the Russian Federation, which was characterized by:

• variety of implementation of assistance practices,

• the breadth of practical boundaries for the use of support technologies,

• understanding of the "multidimensional realities" with which professionals had to interact,

• "relativity of truths",

From the point of view of the British researcher F. Williams, it determined the essence of postmodern approaches [31]. The "multidimensionality of realities", the variety of social problems faced by professionals, required the discovery of various types and types of social protection institutions. And if at the previous stage social work was formalized as an activity for social service at home for pensioners and the disabled, in selected territories, then in the 90s not only the vector of practice, but also the scope of coverage of professional activities in the regions of the Russian Federation changed significantly.

As studies show, in all 86 constituent entities of the Russian Federation, from 1994 to 2006, social protection institutions were opened for various categories of citizens. Families, street children, the unemployed, migrants, and other numerous categories of the needy, determined by the current legislation, were included in the scope of social work. The massive approach to helping those in need has led to the fact that the number of social protection institutions in the first decade of the formation of the social service system has increased by 22.5 times [4].

The decisions that were made during this period may have been optimal in the here and now situation, but they were not the most effective in the situation that inevitably occurs over time.

During the period under review, the construction of a solidary society in the paradigm of postmodernism in Western social states had complex, pragmatic and more "economical" models of mutual assistance than in the Russian Federation.

At the heart of helping strategies in Western countries, the search for models of "easing the burden on the budget of the public sector" was implemented, by redistributing this burden on partners and actors of mutual assistance from other sectors, including the non-state sector.

In the process of developing social work in the world community, by that time such strategies as the deinstitutionalization of social security institutions, the organization of self-help models, the transfer of state social protection institutions to outsourcing, the development of the sector of non-profit services, charitable organizations, the activation of civil society through the practice of volunteering, developing professional support for those in need through the institutions of the Churches, attracting funds and professionals from foreign associations to work with certain categories of clients, including "preserving the traditional family model with care services" [28].

Russia followed its "traditional path" of creating models of a solidarity society by increasing services and building ever new social institutions through the public sector, which was typical of the previous ruling elites, who had been implementing the decisions of party congresses for decades [1,5]

The project "professional social work" had another feature, in addition to the institutionalization of social protection institutions.

The implemented models of social solidarity in the discourses of the ideologemes of postmodernism in this period were characterized by radical individualism.

And if at the stage of modernism, at the beginning of the 20th century, collectivist approaches dominated in identifying those in need, as was the case with the proletariat in Western countries, or as we observed in the early years of the formation of Soviet power in Russia, where not only the proletariat, but also the poorest Since the peasantry, invalids of the civil and imperialist wars had preferences for assistance from the authorities [23], then in this historical time, preference for assistance was determined at the local and individual level.

The difference between the ongoing social reforms of the 90s, from the social reforms of the 20s, was that at the end of the 20th century, social security was not so much the right to receive assistance from "oppressed social communities and groups", an act of realizing historical justice, but rather compensation to individuals and local communities for the lack of "good decisions" in reforming society.

In this regard, the social security policy was associated with the phenomena of extreme relativism, which actually constituted the focus of social work in the context of social security in the discourses of postmodernism, so the collectivist communist models of "universal happiness" were replaced by technologies of individual therapy of an individual case.

The conduct of social policy in the discourses of postmodernism, the solution of clients' problems on the basis of individual rather than collective identity, allowed the ruling elites to consider existing problems not from the standpoint of "concepts of helping the poor", but in "concepts of helping the poor", not from the standpoint of "social inequality", and from the standpoint of "individual insecurity", thus, the ideologemes of human rights were replaced by ideologemes of counteracting the marginalization of society, strategies of assistance and support were implemented from these principles.

However, despite the fact that in this period, international and European banks are actively pursuing a policy of lending to the "modernization of Russian society", and not so much the Russian economy, the ruling elites are gradually developing certain ideas about the need to reduce the growth rate of social institutions and regulate social benefits. -vulnerable groups, both in terms of numbers and their intended purpose, which actually caused the further introduction of the law on the monetization of benefits [20].

This decision was "pushed by a number" of socio-economic and socio-political factors.

On the one hand, the growth of social institutions, almost a 20-fold increase, solved the problems of the needy population in the situation "here and now", but over time, all these institutions had to require huge investments to keep them in working condition, which inevitably led to crisis situation in social security that the

authorities faced in the 80s, but only the emerging situation would have had a larger scale of crisis manifestations.

On the other hand, the use of only state funding in the development of the social sphere in a situation of total privatization, labor strikes, the movement of troops from Western Europe, the conduct of wars in the North Caucasus would inevitably lead to a reduction in social spending, and the curtailment of "intensive differentiated social programs" and searches for other "projects of financing the social sphere".

Social institutions during this period provided assistance and support on the basis of the current legislation, which determined social groups, in accordance with state priorities. At the same time, the state regulated the situations in which it was included in the matter of assistance and support, localized difficult life situations through the professional community of social workers.

Individual service, individual service, sanctioned, as in health care institutions, not only socially deviant forms of behavior acceptable from the point of view of social norms, but also any individual forms of protest and “civil disobedience”.

Through the tools of "social security", "tolerance", "empathic listening", "medial technologies", "problem solving technologies" and other personality-oriented assistance tools, social workers allowed clients to realize their individual aggressive behavior in situations that were conditioned as environmental and individual-group factors.

The main goal of the actions of professionals in this context is the correction of the psycho-socio-emotional state of a person and the prevention of the development of individual forms of protest into mass forms of disorganization based on collective forms of solidarity.

It can be noted that the functions of "supervision-correction" were implemented not only by the institutions of correction, as was observed in previous eras, but also by the institutions of socialization, support and support, which was carried out in the context of the modernization of society.

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TECHNICAL SCIENCES

THE ROLE OF INFORMATION TECHNOLOGIES IN THE DEVELOPMENT OF INTERNATIONAL BUSINESS

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Abstract

The article emphasizes that technology has developed exponentially in the last decade, it has affected our daily lifestyle and affected almost all industries, including international business. It is technology that makes international trade and business flourish, and without technology, international business developed slowly and was more labor intensive.

The information technology market is one of the newest and most rapidly emerging markets in the global economy. Its rapid development raises the question of a clear definition of its essence, features and commodity structure for researchers. International trade in information technologies, which arose only in the recent past, has reached a large scale in recent decades and has a significant impact on the pace of development of trade in other goods and services. With the increase in trade in information technologies and the growth of their importance for the national economies as a means of increasing the efficiency of production and the basis for creating new jobs, the attention of the world community to this commodity market is increasing. And as a consequence of this, there is a growing interest in more complete and comparable statistical data to determine the prospects and trends of market development.

The analysis of international trade in information technologies is associated with a number of difficulties, primarily related to the collection of statistical data. The main sources of this problem are the constant expansion of the forms of supply of information technology to the world market under the influence of scientific and technological progress; difference in the method of accounting for foreign trade operations in countries that are not members of the International Monetary Fund (IMF), which to a certain extent limits the completeness of information on this market).

Keywords: Economics, International business, Information technologies, e-commerce, globalization.

Technology is no longer meant for individual countries or specific groups of people. These days, even the average person has access to some form of technology, which has contributed to the technological revolution and the revolution in international business.

The role of information technology in the development of international business is difficult to overestimate. They influence most areas of international business activity. Consideration should be given to the ways in which technology will affect international business and expectations for the future development of IT. Consider the following spheres of influence:

- telecommunications;
- social networks;
- logistics;
- production;
- market;
- electronic commerce;
- Internet banking [1].

In previous periods of development of international business, writing letters was the only way to communicate with international business partners. These letters could reach the addressee in days, weeks or months. At the moment, technology has shown high growth in this direction. Instant text and video messaging has become available via, for example, Skype or Zoom.

The concept of information and communication technologies appeared at the end of the 20th century. as a result of the convergence of communications and informatics, covering networks, technologies for processing and transmitting information and related services. These technologies should be understood as the activities of receiving, processing, accumulating, distributing and transmitting information through a combination of hardware and software, computing and telecommunications networks and information resources. In fact, ICT combines the communications industry and the information technology sector. The convergence of communications and informatics gave a new impetus to the development of all sectors of the national economy and social life in various directions and led to changes in the spheres of production and consumption of goods and services.

The high role of ICT in the economic development of society contributes to increasing the capabilities of national enterprises in ensuring effective social reproduction, in the growth of the country's participation in the international division of labor. The conducted research shows a close relationship between the level of the country's competitiveness in the world economy and the level of development of information and communication technologies in the country. ICT provides the country with a more efficient use of available financial, production and labor resources, allows for the resolution of problems in a shorter time and at lower costs. Information and communication technologies are one of the main resources for development in this century.

It includes the production of computer equipment, digital communications, the production of software and information services. The contribution of this sector to GDP growth in industrialized countries is about 30%, and the share of employment in the information and communication technology sector in developed countries exceeds this article [2].

In the context of the dynamic development of the economy and the development of market structures in Azerbaijan, the innovative development of all industries and sectors of economic activity is becoming increasingly important. In this process, a special place is given to the development of ICT as a branch of industrial and social infrastructure, the innovation policy in which directly and indirectly affects the management system and the activities of all sectors of the national economy. The widespread use of ICT in other industries brings them to a qualitatively new level of development through the introduction of information technologies, allows them to increase labor productivity and, in turn, accelerate growth rates. A growing ICT industry is a necessary condition for economic recovery.

In addition, it should be noted that in the country's economy, information and communication technologies represent a national commodity resource that was previously used to develop exports. The cadres of specialists currently available in the country testify to the possibility of using them to expand national exports.

Telecommunication technology is what makes international business possible. They are needed to send invoices, work with clients, communicate with suppliers and keep in touch with employees who may live in other parts of the world.

Internet technologies and, in particular, web conferencing, make it possible to hire employees living in other countries. As a result, companies have more opportunities to find key people and save money because they do not need to build a physical office for these employees [3].

Directly hired international employees can often do their jobs from home as long as they have an internet connection. Companies also have the opportunity to hire remote employees through outsourcing centers that provide a workplace and the necessary equipment.

By hiring remote workers around the world, companies can also benefit if they have employees in the same country where key suppliers, vendors and customers are located. Employees around the world not only add variety to the company's activities, but also provide the company with key personnel who can speak the native language of a given country and understand the customs of this country. Such employees, if necessary, can help in holding regional meetings and optimizing business processes in a foreign country.

Speaking of social media, we can say that social media is a branch of telecommunications technology, but it deserves special attention, since social media has given international business a platform through which it can show rapid growth in a short time. Social media tracks global trends in fashion, decor, art, furniture and a variety of other products, which gives international businesses a wealth of information that can be used to minimize costs and maximize profits [4].

Whether it's Instagram, Facebook, Linked In or others, having a social media account allows international companies to connect with their target audience around the world and advertise their products to them. Previously, people found out about the enterprises of other countries with a delay, which, at the moment, with the help of social networks, has become faster and easier.

The impact of information technology on logistics is also high. Over the past 80 years or so, there have been several significant advances in this area. Customers no longer want to wait long for the goods they order, as commercial jets have made the transportation of goods to different parts of the globe affordable and timely. These days, customers are looking for instant satisfaction for their shopping needs, so great care is taken to ensure that orders are delivered as quickly as possible.

The development of air travel and airports around the world has also made travel more affordable for overseas business partners and created a huge boom in the travel industry, creating opportunities for many international businesses.

The use of modern supply chain management software has simplified the management of global procurement, instead of purchasing goods and raw materials within the country of deployment. International business uses this to reduce costs, increase resource efficiency, and also to have greater diversity in raw materials, since the country's domestic market may not fully cover the needs of production.

Information technology has not bypassed the production. An international business that sells goods has already experienced the latest innovations in this field. Technology has played an important role in all manufacturing and related processes such as production planning, financial planning and marketing. Thanks to technology, companies can have manufacturing plants in several different countries, and there is a choice in determining the location of their production, based on where it is easier to get materials and where skilled labor is more affordable [5].

The globalization of the market began to take shape when the transportation and sale of goods in different countries became more accessible and expedient. The Internet is seen as a low-cost network of market globalization in electronic form. Thanks to social media, television and the low cost of transporting goods around the world, there has been a kind of convergence of consumer preferences and tastes. For example, there was a time when only Americans wore jeans, but now people all over the world are interested in buying and wearing jeans, and this is how the globalization of the market works. The same thing happens with brands like McDonald's, Pizza Hut and so on. A global culture is being created in which different countries begin to have similar wish lists and requirements.

E-commerce platforms are platforms or websites that specialize in selling goods over the Internet, usually to an international audience. Over the years, one can observe numerous advances in e-commerce technology. The result has been achieved where almost anyone can create their own e-commerce site without too

much trouble, thanks to all the templates and apps available. This makes it possible for both ordinary people and multi-million dollar corporations to sell their products via the Internet. E-commerce platforms are usually fully integrated with shipping, payment, and customer service systems.

In a broad sense, e-commerce platforms can be a combination of two elements:

1) combining new technologies with elements of traditional stores and direct mail models;

2) the use of new technologies to replace elements of store or direct mail retail.

In this case, the following business models apply.

B2C, business-to-consumer communication, is a type of e-business communication in which the sale is made to members of the public. This allows consumers to go online and buy a product, and allows businesses of any size to find their target audience around the world. This type includes Internet commerce, interactive television, electronic mail and telephone sales.

The next type is B2B, the business-to-business model - an electronic transaction between a manufacturer and its intermediaries, belongs to the field of B2B e-commerce. It is usually assumed that there is some form of contractual relationship between the supplier and the company, and is mainly used for corporate procurement. Trade information and communication between the parties is exchanged electronically using agreed protocols implemented through special commercial solutions designed to facilitate this exchange. It includes bidding on the Internet, electronic document management systems.

Next, consider the C2B model, consumer-to-business communication is another type of e-commerce that allows a potential organization, manufacturer, and even service center to visit their website and offer to buy existing products at the asking price. When an organization accepts their offer, the consumer is obligated to sell the product to that organization.

B2G, business-to-government communication is a new type of communication that involves an electronic transaction between government and business organizations. It includes government tenders, trade procedures, for example, with clients, and so on.

C2C, e-commerce without the participation of business and intermediaries, only between consumers. This is the last type of communication in e-commerce. After receiving an advertisement for the sale of a certain product from any consumer through a consumer exchange site, it is possible to purchase this product at a negotiated price.

Also, information technology has played a significant role in the development of Internet banking, over the past few years one can observe a high level of growth. Paying online, regardless of location, is easier than ever before for customers around the world. You can use a credit card, payment solutions like Raura1, and digital currencies like Wisot in some cases. In addition, exchange rates and payment fees are lower, making international shopping easier and more affordable for the average consumer.

Another important role of information technology in international business is that it has made it easier for companies around the world to learn from each other and make more informed international business decisions. Tech companies in Asia can go online and learn about the products, financial position, and marketing capabilities of their US competitors to better assess their strengths and weaknesses. At the same time, US companies can research overseas markets for their products and assess where business expansion would make financial sense.

Ultimately, online research opportunities can help companies gain a competitive advantage over foreign competitors. It can also encourage innovation when ideas arise to improve an existing product or service to meet the needs of a particular market.

You also need to touch on marketing. The importance of information technology and international marketing comes from how the Internet allows companies to interact with customers around the world. Instead of relying on costly advertising in print, TV and radio, companies can pay for cheaper online advertising through global search engines, register in global business directories and advertise on social media. They can even hire remote marketers in the target region [6].

Companies can also use tools such as customer relationship management (CRM) software to tailor their marketing campaigns to each market's culture and customer preferences. CRM systems help track marketing analytics to understand customer experiences with products and services, and to optimize communications with customers around the world through automated emails and response tracking systems.

Thus, information technology has increased the efficiency of international companies in various business sectors. Whether a company needs to find the best supply chains, study a foreign competitor, provide digital services, find remote employees, or mass-produce products overseas, they can do it quickly through web searches or corporate programs.

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DETERMINATION OF THE PROPERTIES OF RESERVOIR FLUIDS AND GASES FOR THE DEVELOPMENT OF MULTI-LAYER DEPOSITS BY DUAL COMPLETION

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Abstract

The article is devoted to determining the properties of reservoir fluids and gases, as well as performing calculations to determine the dependence of the volume of dissolved gas in oil, the volume coefficient of dynamic viscosity and density on saturation pressure, determining the compressibility coefficient and other necessary indicators for the development of the multi-layer Altyguyi field by dual completion (DC)

This work can be used to determine the heterogeneity of oil and gas in productive horizons for the development of multi-layer deposits by the DC method.

Keywords: volume coefficient, compressibility coefficient, gas-saturated oil, dynamic viscosity, reservoir oil, hydrocarbon fluid, reservoir pressure.

The analytical dependence of the volume of dissolved gas in oil, the volume coefficient of dynamic viscosity and density on the saturation pressure is given in the following form [1, 2]:

$$G = 0{,}3652 \times P_{sat.} + 10{,}265 \quad (1)$$

$$b = 1{,}0839 + 0{,}0008982 \cdot P_{sat.}; \quad (2)$$

$$\mu = 6{,}92526 \cdot \exp^{-0{,}0045489 P_{sat}}; \quad (3)$$

$$\rho = 0{,}000000522 \cdot P_{sat}^2 - 0{,}00053 \cdot P_{sat} + 0{,}8645; \quad (4)$$

here :

$P_{sat.}$ -saturation pressure, kgf/cm^2;

G is the volume of dissolved gas m^3/m^3;

b is the volume coefficient of oil;

μ is the dynamic viscosity, sp;

ρ is the density of reservoir oil, g/cm^2.

To determine the value of the initial volume coefficient at the initial reservoir pressure, the following dependence is used:

$$b_{init.} = b \cdot \left[1 - \beta \cdot \left(P_{res.pres.} - P_{sat}\right)\right]; \quad (5)$$

here:

b- at saturation pressure;

$P_{sat.}$ - volume coefficient of gas-saturated oil;

β is the compressibility coefficient of reservoir oil.

To determine the compressibility coefficient given in this work using a graph of the relationship between saturation pressure and the density of reservoir oil, polynomial interpolations are constructed [3].

$$\beta = \left(8{,}16562 \cdot \rho^2 - 20{,}35479 \cdot \rho + 12{,}12085\right) \cdot 10^{-4}; \quad (6)$$

here:

ρ-density of reservoir oil, g/cm^2

The dynamic viscosity at reservoir pressure of carbonated oil is determined by the formula obtained from the dependence of the Bill graph:

$$\mu_{res} = \mu_{res.sat.} + \sigma \cdot \left(P_{res} - P_{sat}\right); \quad (7)$$

here:

μ_{res} - viscosity of oil with dissolved gas at reservoir pressure and reservoir temperature, sP;

$\mu_{res.sat}$– viscosity of gas-saturated oil at reservoir pressure and reservoir temperature, sP;

P_{res}–P_{sat} – reservoir pressure and saturation pressure, kg/cm^2

σ– the coefficient of approximation of the dependence of the equation of the Beale graph.

The initial values of the reservoir oil of the wells of the NK_9 horizon of the Altyguyi field are given in Tables 1 and 2.

Table 1

The result of the analysis of recombined (artificial) oil samples

Well number	Degree of degassing	Saturation pressure (kgf/cm^2)	Volume of dissolved gas in reservoir oil (m^3/m^3)	Volume coefficient of oil (b)
2	P_{res}	480	-	-
	P_{sat}	374,5	157,8	1,433
	I	350	148	1,406
	II	300	127,4	1,351
	III	250	107	1,296
	IV	200	86,5	1,241
	V	150	66,1	1,186
	VI	100	45,6	1,130
		50	25,2	1,075
3	P_{res}	408	-	1,418
	P_{sat}	342	150,7	1,435
	I	288	118,8	1,387
	II	216	89,4	1,360
	III	144	60,8	1,256
	IV	72	35	1,100
		360	15,5	1,060
4	P_{res}	504	-	1,367
	P_{sat}	408	148,0	1,384
	I	336	125,5	1,360
	II	240	107,0	1,312
	III	144	75,3	1,269
	IV	48	45,3	1,210
		12,0	13,9	1,040
7	P_{res}	408	-	1,260
	P_{sat}	326,4	96,5	1,320
	I	240,0	77,3	1,300
	II	168,0	60,0	1,270
	III	84,0	37,1	1,230
10	P_{res}	338,4	137,7	1,380
1	P_{sat}	367,0	149,0	1,406

Table 2

The result of the analysis of recombined (artificial) oil samples

Well number	Dynamic viscosity of oil, sP	Oil density g/cm^3		Gas density g/l
		in formation conditions	in atmospheric conditions	
	-	-	-	-
	1,261	0,729		
	1,357	0,737		
	1,600	0,753		
2	1,879	0,771	0,9024	0,730
	2,245	0,790		
	2,773	0,811		
	3,622	0,835		
	5,028	0,861		
	1,745	-	-	-
	1,623	0,734	0,9100	0,565
	2,107	-	-	-
3	2,737	0,768	-	-
	3,760	0,856		
	5,550	0,862		
	8,200	-		
	1,290	-	-	-
	1,163	0,745		
	1,590	0,746		
4	2,096	0,762	0,9035	0,569
	2,975	0,767		
	4,999	0,780		
	6,900	0,881		
	2,240	-	-	-
	2,126	0,760	0,916	-
7	2,763	-		
	3,798	0,764		
	5,612	0,772		
10	1,356	0,749	0,8982	-
1	1,176	0,737	0,9121	-

The initial value of the main physical indicators of the oil horizon NK_9 Altyguyi field:
- Initial volume of dissolved gas in reservoir oil -148.6 m^3/m^3;
- The initial volume coefficient of gas-saturated oil is 1.408;
- The initial coefficient of dynamic viscosity of gas-saturated oil is 1.316 sp.

The composition and properties of hydrocarbon fluids are given in Tables 3, 4 and 5.

Table 3

Initial values of reservoir oil indicators of the NK_9 horizon

Well number	Initial saturation pressures kg/cm^2	Initial volume of dissolved gas in reservoir oil m^3/m^3	Initial volume coefficient of gas-saturated oil	Initial coefficient of dynamic viscosity of gas-saturated oil, sP
1	367	149	1,406	1,176
2	374,5	157,8	1,433	1,261
3	342	150,7	1,435	1,623
4	408	148	1,384	1,163
7	326,4	96,5	1,320	2,126
10	338,4	137,7	1,380	1,356

Table 4

Properties and composition of oil and condensate (horizontal average)

Horizon	Perforation interval (m)	D^{20}_4	T_{sol} C^0	Viscosity, sPz	
				20 C^0	50 C^0
oil					
NK-9	3670-3680	0,9103	+36	non - fluid	63,8
condensate					
NK -7d	3512-3624	0,7943	-3	1,9	-
NK -8	3616-3625	0,7903	+3	1,8	-

Table 5

Properties and composition of oil and condensate (horizontal average)

Horizon	Perforation interval (m)	End of boiling %, up to temperature C^0					
		100	150	200	250	300	exit
oil							
NK -9	3670-3680	-	4	7	10	16	-
condensate							
NK -7d	3512-3624	12	29	42	56	74	90
NK -8	3616-3625	9	27	42	57	76	93

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NEUTRAL GROUNDING MODE IN THE 6–35 KV NETWORK THROUGH AN ARCING REACTOR AND ORGANIZATION OF RELAY PROTECTION AGAINST SINGLE-PHASE GROUND FAULTS

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Abstract

The choice of the neutral grounding mode in the 6–35 kV network (or, in other words, the method of neutral grounding) is an extremely important issue in the design and operation. In this article, one of the neutral grounding modes in 6-35kV networks is considered - through an arcing reactor. The choice of the neutral grounding mode in 6–35 kV networks is an extremely important issue in the operation and design of the network.

The use of modern neutral grounding equipment in 6–35 kV networks (arc-quenching reactors with low-voltage shunt resistors and high-voltage neutral grounding resistors) can significantly improve the reliability of networks, automate the search for a damaged feeder and reduce accidents in case of single-phase ground faults.

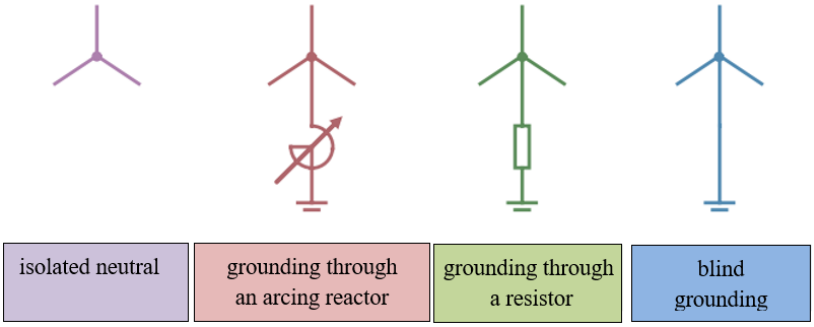
Keywords: neutral grounding, arcing reactor, shunt resistor, arc surges

The neutral grounding mode in the 6–35 kV network determines:

- current in the place of damage and overvoltage on undamaged phases in case of single-phase circuit;
- scheme for constructing relay protection against earth faults;
- electrical equipment insulation level;
- uninterrupted power supply;
- allowable resistance of the substation ground loop;
- safety of personnel and electrical equipment during single-phase faults.

Thus, it is obvious that the neutral grounding mode in the 6–35 kV network affects a significant number of technical solutions that are implemented in a particular network.

In medium voltage networks (with a rated voltage of up to 69 kV according to foreign classification), 4 neutral grounding modes are used (Pic. 1)



Pic.1. Neutral grounding modes for medium voltage networks

That is, all over the world in medium voltage networks (up to 69 kV), in contrast to high voltage networks (110 kV and above), four possible options for grounding the neutral point of the network are used:

- insulated (ungrounded);
- grounded through an arcing reactor;
- grounded through a resistor (low or high resistance);
- deafly grounded.

In addition to these four neutral grounding modes, a combination (parallel connection) of an arcing reactor and a resistor is also used in the world. For example, such a combination is found in German 20 kV overhead networks, where an arcing reactor provides extinguishing of short-term single-phase insulation flashes to earth, and a low-resistance resistor is connected to the neutral of the network in parallel with the reactor only for a short time with a special single-phase power switch.

The resistor in such a circuit serves to selectively determine the feeder with a stable single-phase earth fault. If you look at the world practice of operating medium voltage networks (see table 1), you can clearly see that neutral grounding through a resistor or an arcing reactor is most often used.

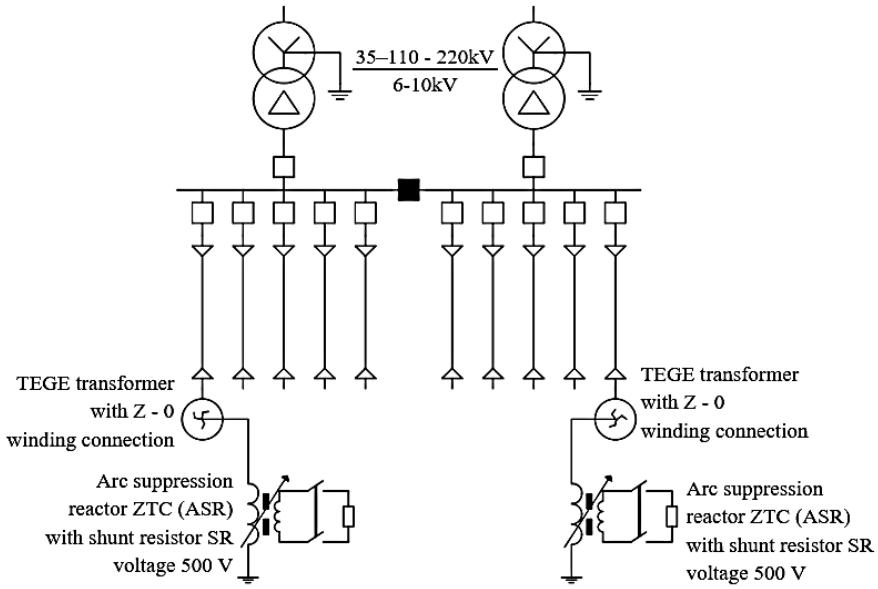
Table 1.

Neutral grounding mode in medium voltage networks 3–69 kV in various countries of the world

Country	Method of grounding the neutral			
	Isolated	Grounded through reactor	Grounded through resistor	Blind grounding
Russia	+	+		
Australia			+	+
Canada			+	+
USA			+	+
Spain		+	+	+
Portugal			+	
France		+	+	
Japan			+	
Germany		+	+	
Austria		+	+	
Belgium			+	
Great Britain			+	+
Switzerland		+	+	
Finland	+	+	+	
Italy		+	+	
Czech		+	+	

Consider one of the neutral grounding modes in 6-35kV networks through an arcing reactor. Picture 2 shows a typical two-transformer substation with neutral on the 6-10 kV side grounded through the arc reactor.

In this mode, a neutral output transformer (with a Y-0/D or Z-0 winding connection) and an arc quenching reactor are connected to the 6–10 kV bus section through a specially dedicated cell.



Pic. 2 Step-down substation with neutral on the 6-10 kV side grounded through the arcing reactor

In case of a single-phase earth fault in the network, the arcing reactor creates an inductive current component equal to the capacitive one at the fault site. In this case, the total current at the fault site becomes almost zero, and the first single-phase ground fault that occurs in the network cannot be turned off.

In medium voltage networks of 3–69 kV in European countries (Germany, Czech Republic, Switzerland, Austria, France, Italy, Romania, Poland, Finland, Sweden, etc.), neutral grounding through an arcing reactor with a low-voltage shunt resistor is widely used (Pic. 2). A low-voltage shunt resistor with a voltage of 500 V is connected through a special contactor to the secondary power winding of 500 V of the arcing reactor. This technical solution has the following advantages:

- no need to immediately disconnect a single-phase earth fault and, accordingly, the consumer;
- low residual current at the point of damage (no more than 1–2 A);
- self-liquidation of single-phase short circuits (especially on overhead lines);
- the possibility of organizing selective automatic relay protection against single-phase earth faults.

In existing 6–35 kV networks with neutral grounding through arcing reactors of the old design with manual control and reactors with magnetization, but without a shunt resistor, there is a problem of organizing selective protection against single-phase earth faults. Both simple overcurrent earth-fault protections (ANSI code 51G) and directional protections (ANSI code 67N) cannot be used on these networks.

The first one is due to the fact that the arcing reactor compensates for the single-phase fault current (current $3I_0$) in the damaged connection almost to zero. The second ones are due to the coincidence of the direction of the current $3I_0$ in the damaged and undamaged feeders in direction. In the damaged feeder, in the direction "from the busbars", an inductive current $3I_0$ flows in magnitude equal to the feeder's own capacitive current, and in undamaged feeders, own capacitive currents flow in the direction "towards the busbars".

The mode of grounding the neutral through an arcing reactor with a shunt low-voltage resistor connected to the secondary power winding with a voltage of 500 V makes it possible to implement selective earth fault protection using both simple current protections (ANSI code 51G) and more complex directional protections in the direction of current 3I0 (ANSI code 67N) or zero-sequence active power ("wattmetric", ANSI code 32). As a rule, earth fault protections in this case act on the signal (the current at the fault is small and its immediate disconnection is not required).

In the presence of a shunt low-voltage (500 V) resistor, the logic for using arc-quenching reactors is as follows. Until a single-phase fault occurs, the arcing reactor is tuned to resonance, and the shunt resistor is turned off. In the initial stage of closing, the arc is usually unstable and re-ignitions and extinctions occur. In this case, the reactor acts as an arc extinguishing device, and allows you not to turn off the damaged feeder.

In the event that the circuit has become stable, with a certain time delay set in the

REG-DPA regulator of the reactor, a shunt resistor is connected (for a period of 1 to 3 seconds). The reactor's REG-DPA digital regulator commands the 500 V shunt resistor contactor to be turned on, which is connected to the reactor's 500 V secondary power winding.

Connecting a shunt resistor for 1–3 seconds creates an active current $3I_0$ only in the damaged feeder, the value of which is determined by the resistance of the resistor and can be from 5 to 50 A. This current is sufficient for the selective operation of even conventional earth fault current protection of a damaged connection.

In normal mode, the low-voltage shunt resistor SR of the arcing reactor is disabled and does not affect the accuracy of the compensation setting. The resistor is connected only for the time required for the operation of the earth fault protection (1–3 sec). The thermal resistance of the resistor is typically 6 to 60 seconds.

The use of modern neutral grounding equipment in 6–35 kV networks (arcing reactors with low-voltage shunt resistors and high-voltage neutral grounding resistors) can significantly improve the reliability of networks, automate the search for a damaged feeder and reduce accidents in case of single-phase ground faults.

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