«елочка»-цветение» и «цветение»-зеленая спелость», что указывает на наличие двух пиков в потреблении подвижного фосфора. При этом больше всего его расходовалось в варианте $N_{20}P_{30}$ + листовая подкормка «Наномикс» в фазу зеленой спелости.

Несмотря на засушливость климата, по всем вариантам с удобрениями сформировались густота и линейный рост растений, образовалось количество коробочек и семян в коробочке, отличающихся от контроля (таблица 1).

Таблица 1 – Элементы структуры урожая льна масличного в зависимости от сроков проведения листовой подкормки микроудобрением

Варианты опыта	Густота растений, шт/м^2	Длина растения, см	Количество коробочек на растение, шт.	Количество семян в коробочке, шт.
1. Контроль (без удобрений)	186	31,2	8,0	5,1
2. $N_{20}P_{30}$ – фон	192	32,5	7,5	5,7
3. Фон + листовая подкормка микроудобрением в фазу «елочки»	201	35,7	9,3	5,5
4. Фон + листовая подкормка микро-удобрением в фазу зеленой спелости	190	32,0	7,8	6,0

Исходя из полученных данных, под влиянием мочевины, простого суперфосфата и на их фоне листовой подкормки, во всех испытуемых сроках ее проведения была густота растений выше контроля, особенно на варианте Фон + листовая подкормка микроудобрением в фазу «елочки». Листовая подкормка незначительно влияла на сохранность растений к уборке.

Длина растений варьировала по вариантам в пределах 30,0-35,7 см. Среди них также выделился вариант с подкормкой в фазу «елочки», в котором встречались отдельные растения с максимальной длиной до 38 см.

И при анализе количества коробочек на растение отчетливое проявление действия листовой подкормки можно наблюдать в фазу «елочки». Коробочек образовалось на 0,7 шт. больше, чем на контроле, тогда как на других вариантах их число на одном растении даже снизилось, несмотря на большую густоту растений: на фоновом варианте – на 0,2 шт. (при густоте 192 шт/м^2) и на варианте с подкормкой в фазу зеленой спелости – на 0,5 шт. (при густоте 190 шт/м^2).

Однако следует отметить, что по количеству семян в коробочке эти варианты превзошли не только контроль, но и лучший вариант – фон + листовая подкормка в фазу «елочки» – на 11,7 и 3,6% (преимущество внесения $N_{20}P_{30}$ без подкормки соответственно перед контролем и третьим вариантом), на 17,6 и 9,0% (преимущество варианта фон + листовая подкормка в фазу зеленой спелости соответственно перед контролем и третьим вариантом).

В целом, изучая структуру урожая льна можно констатировать, что даже в условиях засушливого года листовые подкормки оказывали небольшое, но положительное влияние на рост и развитие растений.

Все представленные элементы структуры урожая формируют урожайность. Из данных таблицы 2 следует, что урожайность семян по всем удобренным вариантам увеличилась до 7,0-8,2 ц/га при 6,4 ц/га на контроле. Прибавки урожайности составили 0,6-1,8 ц/га. Наибольшая величина достоверной прибавки 1,8 ц/га получена при проведении листовой подкормки в фазу «елочки». Несколько меньшую прибавку урожайности обеспечила более поздняя подкормка (фаза зеленой спелости) микроудобрением «Наномикс» – 1,2 ц/га.

Выводы:

- основное потребление нитратов происходит в межфазный период «елочка»-цветение», при этом больше всего нитратного азота расходуется в варианте $N_{20}P_{30}$ + листовая подкормка «Наномикс» в фазу «елочки»;

- потребление подвижного фосфора более высокими темпами осуществляется в межфазные периоды «елочка»-цветение» и «цветение»-зеленая спелость», при этом активное его расходование происходит в варианте $N_{20}P_{30}$ + листовая подкормка «Наномикс» в фазу зеленой спелости;

Таблица 2 – Влияние листовой подкормки льна масличного микроудобрением на урожайность семян и их качество

Варианты опыта	Урожайность семян, ц/га	Прибавка урожая к контролю, ц/га	Масса 1000 семян, г.	Масличность, %
1. Контроль (без удобрений)	6,4	-	6,11	38,05
2. $N_{20}P_{30}$ – фон	7,0	0,6	6,21	38,23
3. Фон + листовая подкормка микроудобрением в фазу «елочки»	8,2	1,8	6,16	39,10
4. Фон + листовая подкормка микроудобрением в фазу зеленой спелости	7,6	1,2	6,18	38,41
$НСР_{05}$	1,4			

- в условиях засушливого 2014 года на темно-каштановых почвах сухостепной зоны Приуралья применение микроудобрения «Наномикс» в подкормку с нормой 2 л/га на фоне $N_{20}P_{30}$ позволяет повысить урожайность и качество зерна льна масличного;

- наиболее оптимальным сроком применения микроудобрения «Наномикс» под лен масличный является фаза «елочки», при котором обеспечивается прибавка урожайности к контролю 1,8 ц/га, улучшаются элементы структуры урожая, повышается масличность семян на 1,05%.

СПИСОК ЛИТЕРАТУРЫ

1 Масличный лен. Современные технологии возделывания / В.А. Гулидова [и др.]. – Воронеж : Агро-Альянс, 2015. – 46 с.

2 Вильдфлуш И. Р. Эффективность применения микроудобрений и регуляторов роста при возделывании сельскохозяйственных культур / И. Р. Вильдфлуш [и др.]. – Минск : Беларус. наука, 2011. – 293 с. – ISBN 978-985-08-1353-4

3 Хелатные микроудобрения или просто хелаты // «Институт почвоведения» (Украина) [Электронный ресурс]. – 19.03.2009 – Режим доступа: http://www.sianieshop.ru /newsdesk_info.php?newsdesk_id=7. – Дата доступа. – 19.05.2010.

4 Ресурсосберегающие технологии возделывания сельскохозяйственых культур на западе Казахстана : рекомендации / под редакцией С.Г. Бисенова. – Уральск, 2009. – 154 с.

5 Доспехов Б. А. Методика полевого опыта / Б. А. Доспехов; изд 5-е перераб. и доп. – М. : Агропромиздат, 1985 – 351 с.

6 Титова Е. М. Влияние некоторых элементов технологии на урожайность и качество зерна ячменя / Е. М. Титова, М. А. Внукова // Вестник ОрелГАУ. – 2010. – №5 (26). – С. 64-68.

ТҮЙІН

Мақалада Орал өңірінің қара қоңыр топырағының құрғақшылық дала аймағы жағдайында майлы зығырда микротыңайтқыштардың қолданылуы туралы 2014 жылдың мәліметтері бойынша талдау жасалды. $N_{20}P_{30}$ тыңайтқыштар фонында «Наномикс» микротыңайтқышпен майлы зығырдың әр түрлі даму кезеңінде үстеп қоректендірудің оның өнімділігі мен сапасына жақсы әсер тигізетіні байқалды.

RESUME

The analysis for 2014 on application of mineral fertilizers under flax oil on dark-brown soils in conditions of dry steppevzone of Cisural area was given in the article. Positive influence of top-dressing by "Nanomix" microfertilizer microfertilizer against the background of ammophos at the use in various terms on productivity and quality of flax oil grain was revealed.

UDC 636.033:615.015.8

A. Z. Zinullin, Candidate of Agriculture Sciences, Associate Professor
A. S. Alibayeva, M. U. Akhmetov, O. I. Imangazy, Master Students
Zhangir Khan West Kazakhstan Agrarian -Technical University, Uralsk, Kazakhstan

OPPORTUNITIES OF USE NATURAL RESISTANCE INDICATORS IN CATTLE BREEDING

Abstract

This article presents the results of studies on natural resistance of Kazakh white-headed cows. Due to basic economically–valuable features, it is given the interpretation of the data and it is determined the opportunity of use the phagocytic and lysozyme activity of blood as breeding features.

Keywords: *resistance, lysozyme, phagocytosis.*

For the realization of the existing genetic potential and accelerated improvement of economically- valuable features of animals it is not enough to use only traditional methods of classical breeding. As a rule, because of the one-sided selection of the cows in terms of productivity, the indicators of the best cows in a herd are highly susceptible to infections, invasive and non-communicable diseases. This conclusion is confirmed by the practice and cattle breeding. Therefore, the definition of natural resistance indicators of cows and use them as economically-valuable features, due to we conducted the selection, are highly relevant. Natural resistance indicators of cows can be used in the natural resistance evaluation of cows, and consequentlyin the selection of highly productive breeding cows and heifers in the breeding nucleus and breeding group, as well as breeding bulls.

Concerning the problem of animal resistance to pathogenic principles, we should pay attention to the fact that it depends not only on the body's ability to form specific immunity, but also on other genetically determined factors of natural resistance.

The features which determines NR of cowsis protectors of the organism to various unfavorable environmental effects. They are in the body from the birth to the last day of an animal and react differently to an irritant, being inherited.

We can define the level of NR in numbers by modern methods of laboratory analysis. Its indicators gain significant pathogenetic and prognostic role in diseases.

Undoubtedly, the dominant factor in the NR is phagocytosis, as one of the immunological effector mechanism of animals' welfare. A significant role in NR forming does the process of intracellular digestion (lysozyme). Lysozyme performs important biological functions in the body and, first of all, has a stimulating effect on phagocytosis. Therefore, changing the contents of this enzyme (muramidase) can contribute to atypical course of the pathological process. Also, lysozyme is considered to be pre-factorof T lymphocytes and monocytes, hence, lysozyme activity in blood serum of animals can be seen as an informative feature of NR.

The methods for determining the level of phagocytosis and lysozyme activity of blood serum are simple and available. At the same time it allows us to estimate the steadiness of cowsto diseases and to general adaptation capabilities.

In order to assess the development of the technology of natural resistance of animals and the development of methods for determining the level of phagocytosis and lysozyme activity of blood serum by the method of random sampling, we took blood samples and isolated serum samples from 22 Kazakh white headed cows, in the farm "Akhmetov."

Determining the level of phagocytosis is based on the definition under in-vitro, the ability of peripheral blood neutrophils of studied cows (stagingopsono-phagocytic reaction - OPF) phagocyte (absorb) the microbial cells. As a test sample for OPR, cysts crustaceans Artemia salina were used. Phagocytic activity (PA) was defined by the percentage of phagocytic neutrophils to the total number [1].

For this, the following equipment, materials and reagents were used:

- Anticoagulant 2% - sodium citrate solution was isotonic solution;
- 0,85% - solution was sodium chloride;
- Cysts crustaceans Artemia salina;
- Microscope Biomed -2;
- Pipette 1 ml graded; Pasteur pipettes; bacteriological test tubes;
- Fresh venous blood of acow, which was taken in conditions of excluding microbial contamination and cooling;

Procedure of OPR.The cysts of Artemiasalina crustaceans were added into 2 ml of fresh blood. Then we prepared from thick smears out of this mixture,dried them in the air, fixed with ethanol for 20 minutes and dyed with Romanowsky eosin (1-3 ink droplets per 1 ml distilled water) for 20-30 minutes (by visual inspection with using a microscope).

Evaluation of reaction. With the help of the microscope at the lens 90 and the eyepiece * 10 * without immersion,we defined for at least 50 neutrophils phagocytosein the dyed blood smears. We were counting the number of absorbed microbes in each phagocytosed neutrophil producing the the total number of phagocytosed (microbes with all the active neutrophils).

In general, for a complex evaluation of the phagocytosis level, researcher must have the following data:

- The number of neutrophils in the blood smear taken into account while calculating phagocytosis- to set at least 50 phagocytic neutrophils;
- The number of phagocytosed microbes (total - the total number).

Phagocytossc activity is determined by the formula:

$$PA = (50 * 100) / Nc,$$

where, Nc - the total number of counted neutrophil read-through OPR; 50 - the number of phagocytosed by neutrophils (it can vary); 100 - conversion to percentages.

The ability of lysozyme to lyse quickly E-coli.is based on the method of determining the lysozyme activity in blood serum of cows. Evaluation of lysozyme activity was carried out using nephelometry to change the optical density of the suspension E.-coli after adding in its serum.

Equipment, materials, reagents:

- The daily sample of E - coli;
- 0,5% - solution of sodium chloride;
- pH - meter (ionometer);
- Spectrophotometer Cary-50 with the cuvette, the working length is 10 mm;
- Glass pipettes graduated to 1 or 10 ml.

Overnight E-coli.sample, grown on solid agar was rinsed with 0,5% - sodium chloride solution (pH 7.2). The density of the bacterial suspension was adjusted to 20% transmittance with a spectrophotometer Cary-50 at a wavelength of 420 nm.

A standardized bacterial suspension was dispensed into 4.5 ml bacteriological vials and added to them 0.5 ml of cattle serum (1: 5 dilution). In the control vials were added 5 ml of a suspension of the test - sample.

In the experimental and control samples (test) was transferred into the cell with a working length of 10 mm and a spectrophotometer Cary-50, the percentage of light transmission.

Tubes with control and test samples were placed for 1 hour in an incubator, after which the percentage of light transmission measured.

Calculation of lysozyme activity was done by the formula:

$$LA = [(D1 * K - D0) * 100] / D1 * K$$

where, LA - lysozyme activity of blood serum,%; D1 and D0 - optical density of the contents of the test samples before and after incubation; K - a constant equal to 1 (one) [1].

Live weight of cows was determined by weighing. The level of dairy cows was determined by live weight of calves at the age of 6 months. From Table 1we can see that the variability of live weight and dairy cows are quite high - Cv 16.4, 16.3, respectively. At the same time, the variability of the phagocytic activity and lysozyme are high too- Cv 39.2 - 48.0, which apparently indicates a high diversity of factors affecting the performance of natural resistance of animals. Therefore, we can assume that the heritability of natural resistance indicators should be lower than the heritability of economiccally – valuable features as milk and live weight. However, this in no case can not deny the role of heredity in determining the level of natural resistance, as evidenced by numerous scientific studies of the problem [2]. Furthermore, we should take into consideration that the selection of animals in such economically valuable traits like body weight and milk has been done for decades, which led to a decrease in diversity of these traits, while in terms of the natural resistance of artificial selection in herds of Kazakh white-headed never done. But despite this, the confidence limits of the average for the phagocytic activity and lysozyme is more or less approximate, and do arithmetic mean is statistically highly significant (P> 0.999). By all indications given in the table indices studied herd animals fit into the limits in 2δ. Therefore, by the purposeful selection we can achieve relatively rapid improvement of herd on all these features, particularly on resistance.

Table 1 – Indicators of economically valuable features.

Features	n	Lim.	$\bar{x}$±Sx	Confidence bounds	P	σ	Cv
Live weight	22	304 – 580	439.3±15.7	423.6 - 455.0	>0,999	72.22	16.4
Milk	14	100 – 189	164.6±7.4	157.2 -172.0	>0,999	26.80	16.3
Phagocytic activity	22	2 – 38	22.2±2.0	20.2 -24.2	>0,999	8.70	39.2
Lysozyme activity	22	1 - 81	50.0±5.2	44.8 - 55.2	>0,999	24.0	48.0

Live weight of cows increases steadily up to 5 years of age, while the average and maximum rates of phagocytosis and lysozyme activity by age periods remain relatively stable (Table 2). In this case, it is noteworthy that the owners of minimum indicators of natural resistance were young cow. Lack of individuals with very low natural resistance among mature cows apparently due to the fact that such individuals are knocked out of the herd due to disease at an earlier age.

Revealed feature displays the level of natural resistance has a very important practical significance, since the selection of animals for breeding in terms of natural resistance can be carried out at an early age, which in turn contributes to the acceleration of the selection process.

Table 2 – Dynamics of economically valuable features and the natural resistance of cows by age

Age / Features	3 years			4 years			5 years			6 years		
	n	Lim.	$\bar{x}$±Sx	n	Lim.	$\bar{x}$±Sx	n	Lim.	$\bar{x}$±Sx	n	Lim.	$\bar{x}$±Sx
Live weight	5	304 - 395	359.6± 20.2	5	400 - 475	423.4± 15.7	6	430 - 580	516.3± 22.2	3	523 - 580	546± 21.4
Milk	-	-	-	5	109 - 181	162.8±1 5.1	6	164 - 189	178± 4.5	3	100 - 161	140.6± 25.1
Phagocytic activity	5	2 - 32	21.2± 2.6	5	10 - 36	25.2± 4.8	6	10 – 36	21.2± 4.5	3	14 - 38	24.0± 8.9
Lysozyme activity	5	14 - 74	43.6± 14	5	1 – 75	41.0± 16.5	6	19 - 75	50.5± 8.8	3	43 - 73	56.3± 10.9

In the case of determining the strategy and tactics of breeding, first it is necessary to identify the presence or absence, the level and nature of correlative connection between economiccally-valuable features and properties of cows. Determination of the coefficient of correlation between phagocytic activity and lysozyme between phagocytic activity and live weight showed no correlative connection between these characteristics (Table 3). At the same time between the phagocytic activity and dairy cows it was determined a significant positive correlative connection of the level is average. The correlation coefficient of 0.30 was considered to be highly significant (P> 0.99).

Table 3 – Correlation coefficient between features

Indicators	Couple features				
	Phagocytic activity – Lysozyme activity	Phagocytic activity – live weight	Phagocytic activity – Milk	Lysozyme activity – live weight	Lysozyme activity– Milk
n	22	22	14	22	14
r±Sr	- 0.03±0,2	- 0.009±0,2	0.30±0,3	0.11±0,2	- 0.50±0,2
P	P<0,90	P<0,90	P>0,99	P<0,90	P>0,95

The correlation coefficient between the lysozyme activity and dairy cows was enough high and negative, that is -0.50. A connection between the lysozyme activity and live weight was weak and positive (0.11). However, the magnitude of this connection was not statistically significant. We should assume that reason contradictory connection lysozyme activity with live weight and dairy cows is in the negative connectionamong thesefeatures, though sometimes we find positive curvilinear correlation is between these features. In studies of A.Zinullin, it was found the Kazakh white-headed cows found that dairy cows of the breed rises to a certain level of live weight–roughly to 580 - 600 kg, and a further increase in body weight of cows leads to a gradual decrease in their milk.

REFERENCES

1 Skopichev V. G. Phisiology-biochemical foundations of natural resistance of animals / Skopichev V. G., Maksimiuk N. N. – S.: Lan, 2009. – 269 p.

2 Plyaschenko S.I. Natural Resistance of animal organisms /Plyaschenko S.I., Sidorov V.T. – L.: Kolos, 1979. – 19 p.

ТҮЙІН

Селекцияда қазақтың ақбас сиыры тұқымы қанының фагоцитарлық және лизоцимдік белсенділіктерін бір-біріне тәуелсіз тұқым қуалайтын белгілер ретінде қолдануға болады.

РЕЗЮМЕ

Фагоцитарная и лизоцимная активности крови коров казахской белоголовой породы могут быть использованы в селекции как взаимно независимо наследуемые признаки естественной резистентности животных.