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The Effect of Plant Protection Products and Albite on the Productivity and Quality of Fodder Galega (Galega Orientalis)

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***Abstract*: The research was aimed at scientific substantiation of the possibility to reach high productivity of fodder galega due to the use of plant protection products and the Albite growth regulator, and their effect on the fodder quality. To achieve this goal, the effect of these factors on the yield of green mass and dry matter, on the collection of gross energy, metabolizable energy of feed units, and digestible protein was studied in 2012 – 2014 during the field experiments and in laboratory studies. As a result of the studies, it has been found that galega had the greatest yield of dry matter, metabolizable energy, energy feed units, and digestible protein on the nonpesticide background with plants double sprayed with Albite, and on the pesticide background — in the phase of spring aftergrowing and budding.**

Prevailing accumulation of crude protein and calcium in the green mass was on the nonpesticide background with double spraying with Albite; of crude fiber — on the pesticide background in the phase of spring aftergrowing; of crude ash — in the phase of seedling + budding; and of crude fat — without introducing any growth regulator. Plant protection products and Albite did not significantly increase the concentration of nitrogen-free extractives (NFE) and phosphorus. The studied factors did not affect the content of gross energy (GE), metabolizable energy (ME) and energy feed units (EFU) in 1 kg of dry matter of galega green mass, and did not increase the concentration of digestible protein in EFU.

***Keywords*: Productivity, dry matter, gross and metabolizable energy, energy feed unit, protein, crude ash, crude fat, fiber, phosphorus, potassium, calcium.**

I. INTRODUCTION

One of the main areas of intensifying production of field fodder is increasing the sowing areas for the galega perennial legume. This is possible by increasing the amounts of the production of its seeds. Its positive biological feature is that the buds are located at the tops of the shoots. This allows direct combine harvesting with undertopping when harvesting for the seeds. The remaining green mass may be used as green fodder, hay, and silage. It is therefore very important to know the effect of plant protection products, the time and number of Albite applications on the productivity and the quality of galega green fodder.

After spraying four times with a 0.01 % solution of gibberellin, the growth of alfalfa increased by 40 % [1]. According to W. G. Corns processing with this growth stimulant did not affect alfalfa growth vigor and its green mass yield [2]. In the conditions of the Leningrad region, treatment of double-crop red clover (Belotserkovsky 33306) with gibberellin contributed to increasing the yield of dry matter, compared to the plants sprayed with water [3]. The studies of V. A. Gushchina in the conditions of the Penza region showed that spraying galega in the second year of use (average for 2000 – 2001) with growth stimulant (JUSS) in the phase of spring aftergrowing had allowed to increase the productivity (ME) by 45.0 % (91.2 GJ/ha) [4].

Increasing the grain productivity of legumes with the use of foliar fertilizer growth regulators was also noted by foreign researchers, such as Kuchlan P. K., Meena, H., Sumathi A. [5–7]. High-quality green forage should contain at least 13 – 16 % of crude protein (9 – 10 MJ of ME) in 1 kg of dry matter [8]. Under the influence of gibberellin, the content of nitrogenous substances and phosphorus in the green mass of red clover did not change during the vegetation season [9]. A. N. Kshnikatkina [10] noted that on average over the years 1997 – 1999, with foliar fertilizing galega with molybdenum on the background of seed treatment with molybdenum and Ecost, the content of protein in the green mass of galega had increased by 1.37 – 1.53 %, compared to the reference (without their use), and foliar application of molybdenum in the second and the third year of life had decreased the value by 0.8 – 1.3 %, while fertilizing with Ecost had increased the content of fiber by 0.2 – 2.1 % and the content of crude fat by 0.23 – 0.35 %; a marked prevalence of digestible protein per fodder unit had been noted, compared to the reference [7]. Increasing the protein content in the grains of legumes with the use of foliar fertilization was also noted by Meena, H. (2018) [6]. Spraying clover with the 2,4 DM herbicide increased the content of acid-soluble organic phosphorus and correspondingly decreased the content of inorganic phosphorus [11]. Currently, huge importance should be paid to adaptive technologies and breeding programs for developing plants resilient to climate changes, which increase productivity and improve global food security [12, 13].

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Thus, one of the elements of the technology that ensure high survival rate, productivity, and quality of the dry matter yield of galega is the use of plant protection products and Albite. However, in the conditions of the Republic of Mordovia, no similar studies have been performed. Therefore, the development and improvement of the methods for cultivating this crop are very actual and relevant, and help increase the production of vegetative protein in the region.

Purpose. The research was aimed at scientific substantiation of the possibility of obtaining high yields of good-quality green mass and dry matter of fodder galega based on the use of plant protection products and Albite in the Republic of Mordovia.

Tasks of the research were the following:

– determining the effect of the studied factors on the productivity of green mass and dry matter, accumulation of gross, ME of feed units and digestible protein.

– identifying the effect of plant protection products and Albite on the accumulation of crude protein, crude fiber, fat and ash, NFE, phosphorus, and calcium, as well as GE and ME,and EFU in 1 kg of dry matter of galega green mass.

The study was performed within the framework of the Comprehensive scientific and technical program of the Ministry of Higher Education of the Russian Federation (State Registration No. 01201002316) on the topic "Improving the technologies of cultivating crops in adaptive-landscape agriculture".

II. METHODS

For achieving the task, field experiments were laid in 2012 – 2014 at LLC Biosphere in the Staroshaigovsky region of the Republic of Mordovia in fodder crop rotation field No. 3 with galega of the 12th, the 13th, and the 14th year of life.

Scheme of the experiment was as follows: Factor A. Plant protection products (Background of plant protection). 1. Without plant protection products (reference – nonpesticide background).

2. Plant protection products (background of using pesticides – spraying with insecticides in the phase of spring aftergrowing – Break 0.05 l/ha; in the budding phase – Sharpei 0.3 l/ha; treatment with herbicides Basagran (2.0 l/ha) + Miura (1.5 l/ha) in the phase of spring aftergrowing; treatment with fungicide Rex Duo – 0.4 to 0.6 l/ha in the phase of spring aftergrowing and budding). Factor B. The use of the Albite growth regulator. 1. Without treatment (reference) 2. Treatment in the phase of spring aftergrowing 40 ml/ha. 3. Treatment in the phase of spring aftergrowing and budding (two times). 4. Treatment in the phases of spring aftergrowing, budding, and bean formation (three times). 5. Treatment in the phase of budding. 6. Treatment in the phase of bean formation.

The area of the first order plot was 60 m2 (12 x 5 m). The area of the second-order plot was 10 m2 (2 x 5 m). The experiment was repeated three times with systematic placement. Following the tasks set, the experimental work was based on the method of laboratory and field studies. The object of the research was fodder galega of the Alginski variety.

The field experiments were laid, observations and surveys were performed following the guidelines of B. A. Dospekhov [14]. The chemical composition of green mass was determined according to the State Standards, the content of crude protein in the plants – according to GOST 51417-99 [15], of crude fat – according to GOST 13496.15-97 [16], the content of crude ash – according to GOST 26226-95 [17], of crude fiber – according to GOST 13496.2-91 [18], the content of calcium, phosphorus – according to FSBI Agrochemical Research Station Mordovia. The content of dry matter in the green mass was determined by the gravimetric method.

The concentrations in the green mass yield of GE and ME (for cattle), power feed units, and digestible protein were determined by the calculation based on the chemical analysis of plants (Zootechnical analysis of forages, 1981), given the coefficients of digestibility according to M. F. Tomme [19].

The yield rate of green mass was accounted for by cutting plants from 3 m2 of each plot, repeated three times after 100 % beans browning. The obtained data were processed by the method of variance analysis according to R. A. Fischer using statistical software on a personal computer [14].

III. RESULTS

The research showed that on average over the years 2012 – 2014, the use of plant protection products had contributed to increasing the yield rate of green mass by 5.7 % (Table 1).

Table 1: Green mass yield rate, t/ha

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	13.96	17.33	17.88	15.95	15.83	14.46	15.90
The use of pesticides	16.11	18.98	15.84	17.14	17.97	14.78	16.80
On average for factor B	15.04	18.16	16.86	16.55	16.90	14.62	16.35
$LSD_{05}A = 0.89$; $LSD_{05}B = 1.54$; LSD_{05} for individual differences = 2.18							

It was the highest in case of Albite introduction in the phase of spring aftergrowing. Here on the pesticide background, this indicator prevailed, compared to the reference, by individual differences. There was no interaction of factors. Moderate correlation (r = 0.57) was found between the yields of green mass and seeds, with the photosynthetic potential (r = 0.69), which was expressed by the equation of linear regression Y = 8.1 + 2.4x significant for x = 2.8 – 4.0.

On average for the years 2012 – 2014, the use of plant protection products contributed to increasing the accumulation of dry matter by 10.6 % (Table 2).

Table 2: The yield of dry matter, t/ha

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	5.22	6.26	7.85	6.38	6.83	5.85	6.40
The use of pesticides	6.52	8.19	6.93	6.81	8.45	5.58	7.08
On average for factor B	5.87	7.23	7.39	6.59	7.64	5.71	6.74
$LSD_{05}A$ = 0.35; $LSD_{05}B$ = 0.61; LSD_{05} for individual differences = 0.86							

It was the highest in case of using Albite in the phases of spring aftergrowing, spring aftergrowing + budding, and budding. In considering individual differences, the highest value was noted on the nonpesticide background with spraying plants with the growth regulator two times, and on the pesticide background – in the phase of spring aftergrowing and budding. Positive interaction of factors was established. The maximum yield of the dry matter was (8.44 t/ha) in 2013. If this value is taken for 100 %, in 2012, it amounted to 59.2 %, and in 2014 – to 80.4 % of this value.

The use of plant protection products on average for the years 2012 – 2014 increased the accumulation of ME by 10.8 % (Table 3).

Table 3: Accumulation of ME, GJ/ha

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	51.4	60.9	77.4	62.6	66.8	57.5	62.8
The use of pesticides	64.1	80.2	68.4	66.8	83.5	54.9	69.6
The average for factor B	57.7	70.5	72.9	64.7	75.1	56.2	66.2
$LSD_{05}A$ = 3.4; $LSD_{05}B$ = 6.0; LSD_{05} for individual differences = 8.4							

It was the highest in case of using Albite in the phases of spring aftergrowing, spring aftergrowing + budding, and budding. In considering individual differences, this indicator dominated on the nonpesticide background with the double introduction of growth regulator, and on the pesticide background – in the phase of spring aftergrowing and budding. Positive interaction of factors was established. The maximum accumulation of ME was (83.4 GJ/ha) in 2013, while in 2012 and 2014, it was 58.6 and 79.5 % of this value.

On average over the years 2012 – 2014, the use of plant protection products increased the accumulation of EFU by 10.9 % (Table 4).

Table 4: Accumulation of EFU, t/ha

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	4.89	5.79	7.40	5.97	6.36	5.48	5.98
The use of pesticides	6.10	7.63	6.51	6.36	7.92	5.26	6.63
On average for factor B,	5.50	6.71	6.96	6.16	7.14	5.37	6.31
$LSD_{05}A$ = 0.33; $LSD_{05}B$ = 0.57; LSD_{05} for individual differences = 0.80							

It was the highest in case of Albite introduction in the phase of budding. In considering individual differences, this indicator dominated on the nonpesticide background with the double introduction of growth regulator, and on the pesticide background – in the phase of spring aftergrowing and budding. Positive interaction of factors was established. The maximum accumulation of ME was (7.94 GJ/ha) in 2013, while in 2012 and 2014, it was 58.7 and 79.6 % of this value.

The use of plant protection products on average for the years 2012 – 2014 increased the accumulation of digestible protein by 10.5 % (Table 5).

Table 5: Accumulation of digestible protein, t/ha

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	0.47	0.53	0.73	0.56	0.61	0.52	0.57
The use of pesticides	0.59	0.73	0.61	0.62	0.73	0.51	0.63
On average for factor B	0.53	0.63	0.67	0.59	0.67	0.52	0.60
$LSD_{05}A$ = 0.03; $LSD_{05}B$ = 0.05; LSD_{05} for individual differences = 0.08							

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It was the highest in case of using Albite in the phases of spring aftergrowing, spring aftergrowing + budding, and budding. In considering individual differences, this indicator dominated on the nonpesticide background with the double introduction of growth regulator, and on the pesticide background — in the phase of spring aftergrowing and budding. Positive interaction of factors was established. The maximum accumulation of digestible protein was (0.74 GJ/ha) in 2013, while in 2012 and 2014, it was 64.8 and 78.4 % of this value.

With the introduction of plant protection products on average over the years 2012 – 2014, a tendency to increase the content of crude protein in the dry matter of green mass of fodder galega up to 0.11 % was observed (Table 6).

Table 6: The content of crude protein in the green mass, % of the dry substance

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	11.36	10.61	11.86	10.93	11.61	11.43	11.30
The use of pesticides	11.49	11.23	11.42	11.69	11.09	11.54	11.41
On average for factor B	11.42	10.92	11.64	11.31	11.35	11.48	11.36

It was the greatest with the double use of Albite. In the same variant, this value dominated on the nonpesticide background in the consideration of individual differences. On average over the experiment, the concentration of crude protein was the highest in 2012 (12.24 %), in 2013 it was 11.14 %, and in 2014 – 10.68 %. A weak reverse correlation ($r = –0.16$) was observed between this indicator and the yield of green mass, as well as similar average with the content of crude fiber ($r = – 0.60$) and with PP ($r = –0.42$); the average direct – with crude ash ($r = 0.48$) and PPP ($r = 0.46$).

The use of plant protection products on average over the years 2012 – 2014 did not significantly affect (the difference of 0.51 %) the content of crude fiber in the dry matter of the green mass (Table 7).

Table 7: The content of crude fiber in the green mass, % of the dry substance

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	29.50	31.86	29.87	30.77	29.58	28.46	30.01
The use of pesticides	28.91	32.17	27.34	29.24	30.69	28.67	29.50
The average for factor B	29.20	32.02	28.60	30.00	30.14	28.56	29.76

Its maximum value was noted in case of introducing Albite in the phase of spring aftergrowing; the excess over the reference was 2.82 %. In the same variant on the pesticide background, this figure dominated in consideration of individual differences. The highest content of crude fiber (31.78 %) on average over the experiment was observed in 2014; in 2012 and 2013, it was 28.64 and 28.10 %, respectively. A medium and strong correlation was found between this indicator and the green mass yield rate ($r = 0.69$) and with PP ($r = 0.72$). They were expressed by corresponding linear regression equations: 1) $Y = 19.2 + 0.6x$, significant for $x = 13.96 – 19.00$; 2) $Y = 21.8 + 2.3x$, significant for $x = 2.8 – 4.0$. Medium relationship was observed between the concentrations of crude fiber and K_{par} ($r = 0.44$) and crude fat ($r = 0.38$); reverse relationship – with crude ash ($r = – 0.58$).

On average for the years 2012 – 2014, the use of plant protection products contributed to increasing the concentration of crude fat by 0.11 % (Table 8).

Table 8: The content of crude fat in the green mass, % of the dry substance

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	2.35	2.56	2.66	2.49	2.70	2.59	2.56
The use of pesticides	3.11	2.93	2.21	2.49	2.69	2.60	2.67
The average for factor B	2.73	2.74	2.44	2.49	2.70	2.60	2.62

The use of Albite did not increase this value. In terms of individual differences, this value dominated on the pesticide background without any growth regulators. The minimum content of crude fat (1.96 %) was noted in the arid year of 2014, and in 2012 and 2013 it was 3.03 %. Medium correlation dependence ($r = 0.41$) was found between this indicator and the yield of green mass, with crude fiber ($r = 0.38$), and the same reverse dependence was found with phosphorus ($r = – 0.38$).

Treating fodder galega with plant protection products on average over the years 2012 – 2014 increased the content of crude ash only by 0.12 % (5.67 %, Table 9).

Table 9: The content of crude ash in the green mass, % of the dry substance

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	5.22	5.42	5.51	5.29	6.06	5.82	5.55
The use of pesticides	5.97	5.48	6.12	5.77	5.18	5.48	5.67
The average for factor B	5.60	5.45	5.82	5.53	5.62	5.65	5.61

It was the maximum with double introduction of Albite (5.82 %). In the same variant on the pesticide background, this figure dominated (6.12 %) in consideration of individual differences. The content of crude ash on average over the experiment decreased over the years 2012 – 2014 (from 6.61 to 5.31 %). Between this indicator and the yield of green mass, a weak reverse correlation (r = -0.17) and a weak direct correlation with PPP (r = 0.20) were observed.

The research of the authors showed that on average over the years 2012 – 2014, treatment of fodder galega with plant protection products and Albite had not significantly increased the content of NFE in the dry matter of galega green mass (table 10).

Table 10: Content of NFE, % of dry substance

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	51.6	49.6	50.1	50.5	50.0	51.7	50.6
The use of pesticides	50.5	48.2	52.9	50.8	50.3	51.7	50.7
The average for factor B	51.0	48.9	51.5	50.6	50.2	51.7	50.6

This figure insignificantly varied over the years. On average over the experiment, its concentration in 2012 was 49.90 %, in 2013 – 51.60 %, and in 2014 – 51.10 %.

The use of plant protection products on average for the years 2012 – 2014 reduced the content of calcium by 4.9 % (Table 11).

Table 11: The content of calcium in green mass, g/kg of dry matter

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	14.05	14.56	16.18	15.31	15.29	15.73	15.19
The use of pesticides	13.47	14.23	15.40	15.56	14.20	13.86	14.45
The average for factor B	13.76	14.40	15.79	15.44	14.74	14.80	14.82

This value was the maximum in case of introducing Albite (15.79 g/kg); the excess over the reference was 14.8 %. In the same variant on the nonpesticide background, this figure was higher (16.18 mg/kg) than individual differences, and was higher by 15.2 % than in the reference. The calcium content varied over the years. On average over the experiment, it was the maximum (15.86 mg/kg) in 2014, and the minimum in 2013 – 13.64 mg/kg. Medium correlation dependence was noted between the concentration of this element and raw fat (r = 0.43), weak dependence – with crude ash (r = 0.28), with PPP (r = 0.19) and the green mass yield (r = 0.07); and weak reverse dependence – with phosphorus (r = –0.17).

On average over the years 2012 – 2014, the use of plant protection products and Albite did not increase the content of phosphorus (Table 12).

Table 12: The content of phosphorus in green mass, g/kg of dry matter

Plant protection background	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	3.19	2.77	2.89	2.81	2.79	2.94	2.90
The use of pesticides	2.98	2.80	3.13	2.79	2.67	3.06	2.91
The average for factor B	3.08	2.78	3.01	2.80	2.73	3.00	2.90

The concentration of this element varied over the years of the research. On average during the experiment, its maximum value (3.08 g/kg) was observed in the normally watered year 2012; in 2013, the value was 2.86 g/kg, and the lowest value was observed in the arid year 2014 – 2.77 g/kg. A strong reverse correlation was found between the phosphorus content and the yield of green mass (r = -0.71), crude fiber (r = – 0.72), with PP (r = – 0.72), which were expressed by respective linear regression equations: 1) Y = 4.12 + 0.07x, significant for x = 13.96 – 19.98; 2) Y = 5.29 – 0.08x, significant for x = 27.3 – 32.2; 3) Y = 3.79 – 0.26x, significant for x = 2.8 – 4.0; similar to medium crude fat (r = -0.38); average direct dependence – with K_{par} (r = 0.62; Y = 3.58 – 0.41x, significant for x = 1.30 – 1.93), with crude protein (r = 0.32), weak — with raw ash (r = 0.21) and PPP (r = 0.14). The authors found that during the years of the research, the use of plant protection products and Albite had not affected the content of GE in 1 kg of dry matter of galega green mass (Table 13).

Table 13: The content of GE in 1 kg of dry matter in green mass, MJ

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	18.5	18.6	18.6	18.6	18.5	18.5	18.6
The use of pesticides	18.6	18.7	18.3	18.5	18.6	18.5	18.5
The average for factor B	18.6	18.6	18.4	18.6	18.6	18.5	18.6

Over the years, the concentration of GE did not change significantly (18.6 – 18.4 MJ/kg).

On average over the years 2012 – 2014, the use of plant protection products and Albite did not affect the content of ME in 1 kg of dry matter of galega green mass (Table 14).

Table 14: The content of ME in 1 kg of dry matter in green mass, MJ

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	9.84	9.72	9.84	9.79	9.73	9.83	9.79
The use of pesticides	9.81	9.77	9.82	9.80	9.84	9.88	9.82
The average for factor B	9.82	9.74	9.83	9.80	9.78	9.86	9.82

The concentration of ME per kilogram of feed did not change significantly over the years (9.75 – 9.88 MJ/kg).

The content of EFU per kilogram of dry matter of green mass in 2012, 2013 and 2014, and the average for the years 2012 – 2014 did not differ significantly from the studied factors (Table 15).

Table 15: The content of EFU in 1 kg of dry matter of the green mass

Plant protection background (A)	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	0.94	0.92	0.94	0.93	0.93	0.94	0.93
The use of pesticides	0.93	0.93	0.94	0.93	0.94	0.94	0.94
The average for factor B	0.94	0.92	0.94	0.93	0.94	0.94	0.94

It did not vary significantly over the years (0.93 – 0.94).

On average over the years 2012 – 2014, plant protection products and Albite did not significantly increase the content of digestible protein per an energy feed unit (Table 16).

Table 16: The content of digestible protein in 1 EFU, g

Plant protection background	The variant with the use of Albite (B)						On average for factor A
	1st	2nd	3d	4th	5th	6th	
Without pesticides (reference)	96	90	99	93	98	96	95
The use of pesticides	97	95	96	99	94	97	96
The average for factor B	97	93	97	96	96	97	96

The maximum content of digestible protein in 1 EFU was noted in 2012, while in 2013 and 2014, it was 90.4 % and 87.5 % of this value.

IV. DISCUSSION

Thus, the obtained results allow concluding that the content of ME in the dry matter of green fodder galega used after direct seed combine-harvesting meets the requirements of high-quality fodder. Spraying vegetating plants with the Albite growth regulator increases their productivity; similar results were obtained by V. A. Gushchina [4] with the use of the JUSS stimulant. The same pattern was observed in legumes in case of using foliar growth regulators by foreign researchers Cuchlan R. [5], Mina H. [6], Sumati A. [7]. The authors have found an increased protein content in the fodder upon the use of Albite in the phase of aftergrowing and budding (it contains a lot of microelements in the chelate form), which is also evidenced by the previous studies of A. N. Knishkatkina [10] in case of foliar fertilization of fodder galega with molybdenum on the background of seed treatment with molybdenum and Ecost. While the use of Albite in the phase of spring aftergrowing contributed to increasing the concentration of crude fiber, but did not change the content of fat and digestible protein energy in the feed unit, the previous studies of the same author mentioned above showed their reduction after the treatment with acid ammonium molybdate, and increase after using Ecost. Research of I. V. Mosolov [9] showed that the content of phosphorus in all organs of red clover, after spraying with the gibberellin growth regulator, had not changed; a similar pattern was found by the authors.

The use of herbicides, insecticides, and fungicides did not change the concentration of phosphorus. Similar results were obtained after spraying clover with 2.4 D O. P. Omrod [11]. The authors did not find any studies and publications about the influence of treating the vegetating fodder galega with plant protection products and Albite on the productivity, the chemical composition, and the nutritional properties of the green mass remaining after seeds harvesting.

V. CONCLUSION

Based on the aforesaid, a conclusion may be drawn that galega has the greatest yield of dry matter, metabolizable energy, EFU, and digestible protein on the nonpesticide background with plants double sprayed with Albite, and on the pesticide background — in the phase of spring aftergrowing and budding. Prevailing accumulation of crude protein and calcium in the green mass was on the nonpesticide background with double spraying with Albite; of crude fiber – on the pesticide background in the phase of spring aftergrowing; of crude ash — in the phase of seedling + budding; and of crude fat — without introducing any growth regulator. Plant protection products and Albite did not significantly increase the concentration of NFE and phosphorus. The studied factors did not affect the content of GE, ME, and EFU in 1 kg of dry matter of galega green mass, and did not increase the concentration of digestible protein in EFU.

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