International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 06, 2020
ISSN: 1475-7192

Animal Waste Processing Technology And Poultry Farming In Organomineral Fertilizers

[1]Temirov Uktam, [2]Namazov Shafoat, [3]Reymov Akhmed, [4]Usanbaev Najimuddin, [5]Orakbaev Azamat

ABSTRACT--- *The article presents the results of a study of the processes of obtaining organic fertilizers by composting and accelerated methods based on manure of cattle, poultry manure and substandard phosphorites, which is a waste of enrichment of phosphorites of the Central Kyzyl Kum, as well as the results of agrochemical tests of the resulting organic fertilizers. It is shown that, when composting cattle manure with the addition of substandard phosphorites with an increase in composting duration in all ratios, the formation of humic substances and assimilable phosphorus compounds for plants increase in all ratios, with an increase in the amount of substandard phosphorites in composts, the loss of organic substances and nitrogen is significantly reduced, and the degree of conversion of organic parts of manure in humic substances, the possibility of obtaining nitrogen-phosphorus-humic fertilizers is also shown eny bird droppings by acidification with nitric acid and subsequent decomposition of substandard phosphate using nitric acid-bird droppings.*

Keywords--- *Bird droppings, cattle manure, sludge phosphorites, mineralized mass, nitric acid, humic acids, organic fertilizers*.

I. INTRODUCTION

In all countries of the world, maintaining soil fertility in modern conditions is one of the most urgent tasks of agriculture. An important role in maintaining soil fertility belongs to organic matter and its main component - humus. Humus content is one of the main indicators of soil fertility. Thanks to it, the basic functions are supported and soil fertility is ensured; when mineralized, humic substances provide plants with nitrogen and other necessary nutrients in an accessible form. Humic substances together with mineral particles of the soil form a soil absorbing complex, which determines its absorption capacity, bonding and gluing together mineral particles of the soil, which contributes to the creation of a very valuable water-resistant lumpy-granular structure that improves the water throughput and water-holding capacity of soils, contributes to the fixation of nutrients in it for more rational consumption by plants.

[1] *Doctoral student, Department of Chemical Technology Navoi State Mining Institute, Uzbekistan. Tel: +998905011122, temirov-2012@mail.ru*

[2] *Doctor of technical sciences, professor, academician, head of laboratory of Phosphate fertilizer, Institute of general and inorganic chemistry of Uzbek Academy of Sciences, Uzbekistan.*

[3] *Rector of Kara Kalpak State University, Uzbekistan.*

[4] *Doctor of technical sciences (DSc), Leading Researcher of Phosphate fertilizer laboratory, Institute of general and inorganic chemistry ofUzbek Academy of Sciences, Uzbekistan.*

[5] *Junior Researcher of Phosphate fertilizer laboratory, Institute of general and inorganic chemistry of Uzbek Academy of Sciences, Uzbekistan*.

Received: 22 Feb 2020 | Revised: 13 Mar 2020 | Accepted: 05 Apr 2020

[1-2]. Humic substances can enter into a uniquely wide range of various interactions. The presence of groups such as carboxyl, hydroxyl, carbonyl, in combination with the presence of aromatic structures, provides the ability of humic acids to form hydrogen, ionic and donor-acceptor bonds, to actively participate in sorption processes. For example, humic acids bind water well, are capable of ion exchange, form complexes with metals and interact with various classes of organic compounds. Such unique properties of humic substances determine their widespread use in many areas of industry and agriculture. So, with the regular use of humic substances or fertilizers containing humic substances, the soil structure, its buffering and ion-exchange properties are improved, the activity of soil microorganisms is activated, and many other soil properties that increase its fertility are improved [3-4].

It should be noted that the nutrients of mineral fertilizers, no matter how much they are introduced into the soil, are not able to replace humus as a source of nitrogen and other nutrients released during its mineralization. Organic soil substances contain up to 98% of soil nitrogen reserves, 60% phosphorus, 80% sulfur, all the main trace elements, physiologically active substances, serve as a source of carbon dioxide necessary for plant photosynthesis. It has been established that even with very high doses of nitrogen fertilizers, crop production by 50-60% is formed due to soil nitrogen and humus reserves [5-7].

Soils of Uzbekistan by the content of this most important substance are low-income. The irrigated land fund of Uzbekistan consists mainly of gray soils, gray-meadow, takyr-meadow soils and, to a lesser extent, gray-brown and desert sandy soils. The humus content in the arable horizon ranges from 1,2-0,8 (in gray soils, takyr and meadow) to 0,8-0,55 (in gray-brown and desert sand), while in the same horizon of chernozems of chestnut humus soils contains 4-2%. The specific gravity of soils with a low humus content (0,8-1% in sierozems) is almost 2/3 of the area, with an average (1-1,2%) - 1/3, and with a high (1,2-1,5% of soil weight) - only 7% of the sown area. Humus reserves in the meter soil layer of Uzbekistan are as follows (t/he): light gray earth 82,8; typical serozem 78-79; typical bogar serozem 59,5; dark serozem 150,5; brown soil 318,6; meadow-bog soil 139,2 [8].

In the process of agricultural production using land, part of the humus in the soil is gradually mineralized with the release of nitrogen and other nutrients, which transform into a form assimilable to plants. In this case, the loss of humus may be 0,6-0,7 t/he per year. With high yields of grain crops, the soil annually loses 0,5-1,0 t/he of humus, while cultivating row crops, the loss of humus increases to 1,5-3,0 t/he. It was found that a decrease in the humus content in the soil by 1% leads to a decrease in crop yields by about 5 centners of grain units per hectare [9].

The problem of creating a positive balance of humus in the soil is one of the most urgent tasks in agriculture. Only with the optimum amount of humus in the soil is it possible to obtain a high effect from growing crops. In the reproduction of humus, the role of organic and organic fertilizers is indispensable.

One of the non-traditional sources of replenishment of reserves of humic substances in irrigated soils may be brown coals. Explored coal reserves in Uzbekistan amount to 1 billion 900 million tons. Predicted resources are much higher - more than 10 billion tons. In order to obtain organic fertilizers based on brown coal of the Angren field, a number of studies and pilot-industrial, as well as agrochemical tests of the fertilizers were carried out.

By oxidizing Angren brown coal with nitric acid and the subsequent decomposition of phosphorites of the Central KyzylKum by nitrogen-acid-carbon pulp, an organic-mineral fertilizer of the following composition (wt.%) Was obtained: P2O5total. 9,41; P2O5mas by citric acid 7,71; P2O5 by B–4,78; CaOwater–11,27; N–7,75; organic matter–23,62 [10].

By mixing oxidized brown coal of the Angren field with intermediates of the production of ammophos and suprephos with the ratio of ammophos pulp: wet dense mass of oxidized coal=100:20, an organic-mineral fertilizer containing was obtained P2O5total–32,15%, P2O5: P2O5total – 99,5%, nitrogen–13,47%, humic acids – 15,74%, organic substances – 20,92% with the amount of nutrients 61,36% (N + P2O5 + humic acids). At a weight ratio of suprephosic pulp: moist dense mass of oxidized coal of 100:20, nitrogen-phosphorus-humic fertilizer containing was obtained P2O5total – 17,86%, N – 15,29%, CaO water-soluble – 0,42%, SO3 water–soluble–7,0%, humic acids – 14,67%, with a total amount of nutrients–55,24% [11].

By oxidizing brown coal with nitric acid in the presence of phosphogypsum followed by ammonization of the oxidation products, organomineral fertilizer is obtained containing 14,19% nitrogen, 20,70% humic acids, 32,26% organic substances, 5,38% water-soluble SO3 and 2,31% water soluble CaO.By granulating brown coal of the Angrenskoye field with nitric acid in the presence of sulfuric acid, followed by washing the solid phase of oxidized coal three times with mixing with bentonite clays, drying and granulation, granular carbon-humic bentonite fertilizer with a high content of humic substances was obtained [12].

Based on the studies, a technology for producing organic fertilizers has been developed. Pilot tests were conducted with the release of pilot lots.

Agrochemical tests of the obtained fertilizers based on Angren brown coal and Kyzylkum phosphorites on cotton and wheat showed that, compared with the control version, the yield increase is 4,1 and 9,4 c/he, respectively. The use of this fertilizer for cucumbers increased productivity - by 17,9%, for tomatoes by 13,4%, for potatoes - by 10,3%, and for cabbage - by 23,6% [13-14].

However, due to the complexity of the developed technologies for producing organic fertilizers based on brown coal from the Angren field, implementation on an industrial scale is delayed. Currently, the volume of use of organic and organomineral fertilizers in the republic remains extremely low and insufficient for the reproduction of humus, as well as for maintaining soil fertility.

A good raw material source for obtaining highly effective organic and organomineral fertilizers are: litter manure, litterless manure, bird droppings, peat, green manure, straw, sapropel, household and industrial waste, and sewage sludge [15]. Of these, the cheapest source of organic substances for the reproduction of humus in agriculture is manure of livestock farms [16]. Manure, tested over the centuries, a practical soil improver, one of the most valuable types of organic fertilizers. Academician D.N. Pryanishnikov also believed that manure was - "the most important source of nitrogen, phosphorus and potassium, both in its enormous absolute quantities contained in it and in its cheapness". The introduction of manure on sod-podzolic soil at a dose of 30-80 t/he increases the humus content in the arable layer by 18-64% of the original, or by 17-33 t/he [17]. The main value of manure as fertilizer is that it contains a lot of nitrogen and carbon material. Nitrogen contributes to the growth and development of plants, and this is a yield increase, which, as we know, is necessarily observed when manure is introduced. Carbon material makes up for or even grows the content of humus in the soil, thus laying fertility for the future. And manure is especially valuable because it "works" for several years after it was laid in the soil. In addition to the enrichment of soils with nutrients, manure has a beneficial effect on the physical properties of soils, improves their structure. When compost is applied to the lungs - sandy and sandy loamy soils, their ability to absorb and retain moisture, as well as nutrients, increases. Heavy clay soils become looser, their “cohesion” decreases and air access increases. But in order for manure to give a tangible effect, it is necessary to master the technology of its processing into high-quality organomineral or organic fertilizers.

In Uzbekistan, livestock is one of the leading sectors of agriculture. To date, in Uzbekistan, the total number of cattle has reached 12,7 million heads, and poultry – 75 million. The mass of manure and bird droppings per day reaches 6-8% of the weight of the animal. In total, 110 thousand tons of manure and litter are formed every day. So, the total volume for the year is about 40 million tons.

Currently, cattle manure is partially composted with aging for several months and used in agriculture. In many farms, manure and poultry manure are stored, and the reclaimed organic waste is used as organic fertilizer. In this case, the process of humification is incomplete, and pathogenic microorganisms are almost completely preserved.

Organic waste from animal husbandry and poultry farming must be processed by composting or other methods where conditions are created for the destruction of pathogenic microorganisms and the conversion of insoluble organic substances into soluble in water, alkaline and acidic solutions with the formation of humic substances.

Another serious problem in our agriculture is the provision of phosphate fertilizers. The demand for phosphorus fertilizers declared by the Ministry of Agriculture of the Republic of Uzbekistan is 660 thousand tons per year per 100% P2O5 in 2018, about 150 thousand tons of 100% P2O5 in the form of phosphorus fertilizers were produced. This is due to a lack of high-quality phosphate raw materials, such as washed calcined concentrate (26% P2O5). At the same time, more than 10 million tons of mineralized mass (12-14% P2O5) and 5 million tons of sludge phosphorite (10-12% P2O5), which are the waste products of phosphate enrichment in Central Kyzylkum, accumulated in dumps at the Kyzylkum phosphorite complex. In the general case, 42% of P2O5 from the initial ore is lost annually with them.

In conditions of acute deficiency of phosphorus fertilizers, they must be involved in agricultural production. In our conditions, the most affordable way to use substandard phosphorites is to combine it with organic waste from animal husbandry farms in the form of dung and phosphate composts. Their joint composting causes more vigorous humification of organic substances, reduces nitrogen loss and increases the availability of phosphorus for plants, which leads to an increase in the efficiency of both components since manure and bird droppings contain a significant amount of carboxylic acids that can dissolve hard-to-reach compounds of soil phosphorus and phosphate. That is, under the influence of organic acids formed during the decomposition of manure and bird droppings, phosphorus, which is a part of substandard phosphorites, passes from an unapproachable form into a form that is digestible for plants and thereby will show its fertilizing properties. In addition, the resulting monocalcium phosphate in composts binds (NH4)2CO3 and free NH3 manure into non-volatile forms of nitrogen.

It should also be noted that at present, the phosphorus fertilizer utilization rate is on average 15-25% of the introduced norm, the main factors that negatively affect the effectiveness of phosphate fertilizers are the immobilization of water-soluble salts of phosphoric acid from fertilizers in the soil. The combination of an organic component in the form of humic substances with a mineral component in fertilizers prevents the chemical fixation of phosphorus into poorly soluble phosphates of calcium, magnesium, iron, and aluminum and retains phosphorus in a form accessible to plants [18-19]. It was shown in [20] that only organic fertilizers, when used together with mineral fertilizers, can ensure a deficit-free balance or an increase in humus in crop rotation typical of zones.

II. RESEARCH METHODS.

Based on the foregoing, we conducted a number of studies on the processing of animal waste, poultry and substandard phosphate rock to organic fertilizers.

To study the processes of obtaining organic fertilizers, cattle manure (CM) was used having a composition (wt.%): Moisture – 73,21; ash – 4,32; organic matter – 22,56; humic acids (HA) – 2,58; fulvic acids (FC) – 2,67; water-soluble organic substances (BB) – 2,52; insoluble organic matter – 14,79; P2O5 0,18; N – 0,43; K2O – 0,58; CaO – 0,4 and bird droppings having a composition (wt.%): Moisture – 64,78; ash – 11,29; organic matter – 23,93; GK – 1,04; FC – 7,27; BB – 1,28; P2O5 – 1,25; N – 0,95; K2O – 0,74; CaO – 1,55. The mineralized mass (MM) having the composition (wt.%): P2O5total was used as phosphate feedstock – 14,33; P2O5:P2O5total = 9,01; CaO – 43,02; MgO – 1,19; Fe2O3 – 1,38; Al2O3 1,18; SO3 – 2,22; CO2 – 14,70; insoluble residue – 13,23; CaOtotal:P2O5total=3,0 and sludge phosphorite (SF) having the composition (wt.%): P2O5total – 11,57; P2O5:P2O5total = 11.50; CaO – 41,08; MgO – 0,61; Fe2O3 – 1,42; Al2O3 – 1,84; SO3 – 0,46; CO2 – 20,91; insoluble residue – 14,9; CaOtotal : P2O5total = 3,55.
First, studies were conducted on the production of mineral fertilizers by composting cattle manure and substandard phosphorites. Composts based on cattle manure, with the addition of substandard phosphorites, were prepared at wide weight ratios of the starting components. Compost mixtures were kept at 25 °C for 3 months. Every 15 days, samples were taken to determine the composition.

III. RESULTS.

The results are shown in figures 1-2. From them it is seen that an increase in the mass fraction of phosphate raw materials relative to manure leads in composts to an increase in the content of the general form of phosphorus pentoxide, but to a decrease in the relative assimilable form of P2O5. So, with the weight ratios of manure: MM = 100:2 when the compost is kept for 90 days, the relative content of P2O5mac by B and in a 2% solution of citric acid increases from the initial 16,57 and 9,01% to 69,44 and 61,11%, and with a ratio of 100:25 the content of P2O5mac for Trilon B and for a 2% solution of citric acid is 43,81 and 42,38%, respectively. If the mass ratio of manure: MM = 100:10 after 15 days of composting, the relative content of assimilable P2O5 forms in Trilon B and citric acid is 32,74 and 23,89%, then after 30 days exposure these figures are 39,82 and 30,97%, after 60-day exposure, 52,21 and 46,02%, and after 90-day exposure, 56,64 and 53,10%. That is, with an increase in composting time up to a certain time, the degree of transition of phosphorus from an unapproachable form for plants to an assimilable one increases markedly.

Also, changes in the content of HA, FC, and BB were determined depending on the exposure time and weight ratios of the starting components in composts. It was revealed that, with an increase in composting time, the contents of HA, FC, and explosives in

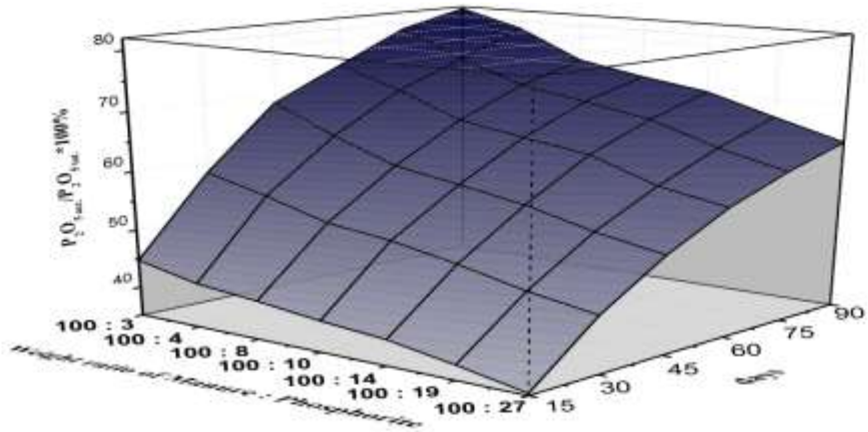

Figure 1: Change in digestible forms of phosphorus in composts depending upon the curing time and weight ratio of Manure : MM

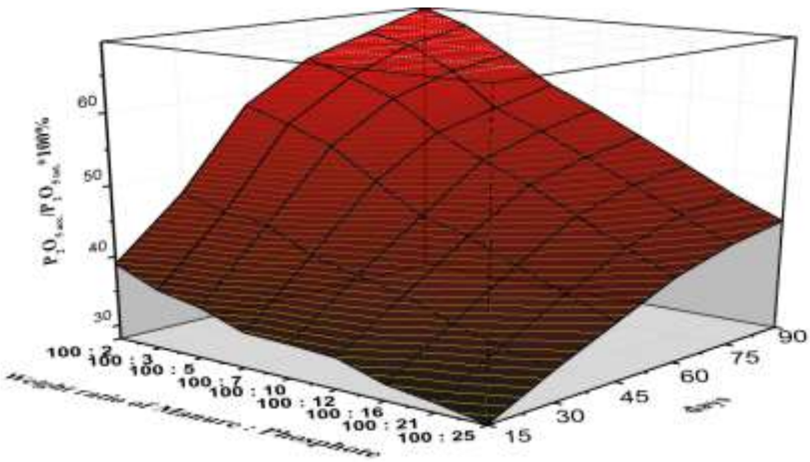

Figure 2: Change in digestible forms of phosphorus in composts depending upon the curing time and weight ratio of Manure : SF

composts gradually increase. If at a weight ratio of manure: MM = 100:2 after 15 days in the composts the content of HA, FC and BB is 2,38%, 2,48%, 2,32%, after 30 days the content of the above organic substances is 2,63% , 2,72%, 2,93%, after a 60-day exposure 3,17%, 3,27%, 3,06%, and after a 90-day exposure 3,41%, 3,52%, 3,28 % respectively. A similar increase in the content of assimilable forms of phosphorus HA, FC and BB is observed in composts prepared using cattle manure with SF [21-22].

The process of converting the non-digestible form of P2O5 raw materials to digestible and humification of organic manure substances during composting with various particle size classes (-0,16; -0,25 +0,16; -0,5 +0,25; -1 +0,5; -3 +2; -2 + 1; -5 + 3 mm) FS. It is shown that the greater the dispersion of PS, the greater the relative content of the assimilable form of P2O5 in manure-phosphorite composts. The highest content of P2O5mac for solutions of both citric acid and Trilon B, 58,72 and 69,72%, respectively, are observed with a particle size of PS less than 0,16 mm. Figure 3 shows the loss of nitrogen and organic matter depending on the weight ratios of the starting components during composting. It can be seen that with an increase in the mass fraction of phosphate raw materials in the mixture, the loss of nitrogen and organic substances decreases markedly. For example, when changing the ratio of manure: MM from 100:2 to 100:25, nitrogen loss decreases from 28.67 to 13,26%.

The final compost product is humified compost. Stable but somewhat humified organic compounds must be contained in the final compost product. The greater the degree of humification of organic substances, the better is the resulting product. Therefore, to assess the quality of finished composts, the degree of humification of organic substances was determined.

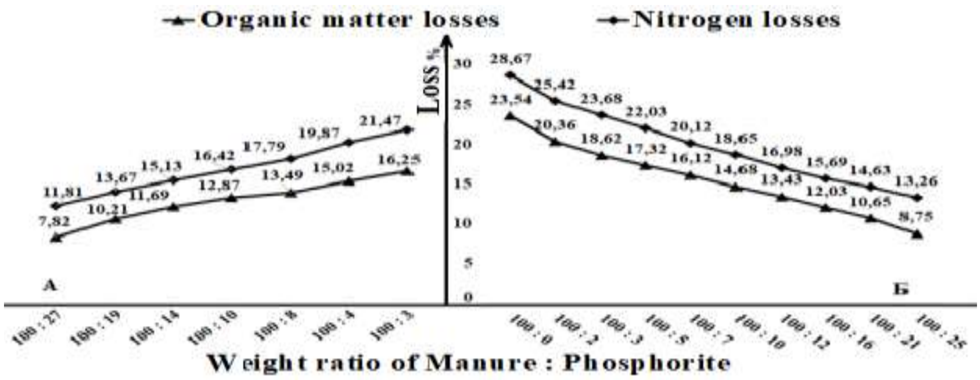

Figure 3: Dependence of reduction of nitrogen and organic matter loss on the ratio of manure: Fossyrie in composts. Raw materials: A - manure of cattle and shf, B - manure of cattle and MM.

The degree of humification of organic substances in finished composts (C_{hum}) was determined by the formula:

$$C_{hum} = \frac{(G_{HC} + G_{FC} + G_{BB}) * 100}{G_1}$$

where, G_1 - total organic matter in compost, g; G_h – G_K, g; G_{FC} – FC, g; G_{BB} – BB, г.

Table 1: The degree of humification of organic substances in ready-made composts

Weight ratio of Manure : MM	100 : 2	100 : 3	100 : 5	100 : 7	100 : 9	100 : 12	100 : 16	100 : 21	100 : 25
Degree of humification, %	52,54	53,07	54,14	56,01	57,32	58,34	59,31	61,09	62,47

Table 2: The degree of humification of organic substances in ready-made composts

Weight ratio of Manure : SF	100 : 3	100 : 4	100 : 8	100 : 10	100 : 14	100 : 19	100 : 27
Degree of humification, %	49,28	50,62	52,36	53,06	54,50	56,46	57,59

When calculating the degree of humification of organic substances, we used the values of HA, FC, and BB found after 90 days of compost exposure in different weight ratios of the starting components. The results are shown in tables 1 and 2. The table shows that the mass fraction of phosphorite introduced into the compost significantly affects the degree of humification of organic substances (Chum). So, in finished composts Chum depending on the ratio of manure: MM is from 52,54 to 62,47%, i.e. it increases with an increase in the mass fraction of phosphorite in composts.

The optimal ratio is determined by the degree of transition of the non-digestible forms of P2O5 to the digestible form for plants and by the degree of humification of organic substances. Based on the point of view of agrochemical and economic efficiency, the optimal ratio is manure: MM = 100:10, in which the relative content of the assimilable form of P2O5 in Trilon B reaches 56,64% (fig. 1), and the degree of humification of organic substances is 62,74% (table 1). Organomineral fertilizer obtained at optimal proportions using cattle and MM manure has the composition, (wt.%): P2O5total. – 1,13; P2O5 by tr B – 0,64; P2O5 in a 2% solution of citric acid – 0,60; GK – 3,17; FC – 3,29; BB – 3,05.

Thus, the results of the study showed that with an increase in the duration of composting, the content of HA, FC, and BB in composts increases, and due to the interaction of these acids with phosphates, an increase in the assimilable forms of phosphorus is also observed. With an increase in the mass fraction of PS in composts, the degree of humification of organic substances increases, and the loss of nitrogen and organic substances decreases.

In the next stage of the work, the processes of accelerated processing of poultry manure using nitric acid and substandard phosphorites were studied that almost completely eliminated the loss of nutrients.

For the study, MM, SF, bird droppings and 59% nitric acid were used. The norm of nitric acid was varied in the range of 10-50% of the stoichiometry for the decomposition of CaO phosphorite. The contact duration of the components was 40 minutes, after which PP was added to the pulp, and stirring was continued for 60 minutes. Drying was carried out at 80 °C until the moisture content in the finished product was 8-10%. Processing of the products of nitric acid decomposition was carried out in the range of weight ratios of bird droppings to MM and SF from 100:10 to 100:40. The experimental results are shown in table 3.

The tables show that the higher the norm of nitric acid and the more PS is taken, the less P2O5total in the product, but the greater the relative content of the assimilable form of P2O5, the water-soluble form of CaO, nitrogen, and OM and GK.

As can be seen from the table 3, with a ratio of bird droppings : MM = 100:10 and a nitric acid rate of 10% of stoichiometry, nitrogen-phosphorus-humus fertilizer is obtained containing P2O5total – 5,18%; P2O5 by lim. to-those – 1,74%, i.e. P2O5:P2O5total – 30,53%; nitrogen – 2,33%; OM – 45,47%; GK – 14,61%. At the same ratio of droppings to MM, but with an acid rate of 50%, a fertilizer containing P2O5 total is obtained. – 4,82%; P2O5 by lim k-te – 3,67%; P2O5mac: P2O5total – 76,14%; nitrogen – 3,92%; OM – 42,33%; GK – 13,60%. Fertilizers of similar composition are obtained in the processing of SF (Table 3). The tables show that the more acid and bird droppings are taken, the more complete the decomposition of phosphorite. So, for MM with a norm of acid of 10% of stoichiometry and a weight ratio of litter to MM of 100:30, the product has (wt.%): P2O5total – 7,87%; P2O5: P2O5total – 28,44%, CaOtotal – 21,98%, N – 2,33%, OM – 32,77% and HA – 10,53%, and at a rate of acid of 50%

and a weight ratio of litter to MM 100:10, the product has (wt.%): P2O5total – 5,00%; P2O5: P2O5total – 76,14%, CaOtotal – 11,70%, N – 4,01%, OM – 43,88% and HA – 14,10%.[23].

Table 3: The composition of nitrogen-phosphorus-humus fertilizer obtained based on the products of nitric acid activation of MM and PP

Norm HNO_3,%	$P_2O_{5tot.}$, %	$P_2O_{5acceptable}$ / P_2O_{5total} * 100%	$CaO_{tot.}$, %	Organic matter,%	Humic substanc es,%	N, %	pH
Weight ratio of Bird droppings : Phosphorite = 100 : 10							
10	5,05	30,53	11,13	45,58	14,64	2,27	7,10
20	4,96	45,22	10,95	44,85	14,41	2,64	6,61
30	4,88	55,02	10,77	44,13	14,18	2,99	6,02
40	4,81	67,33	10,61	43,46	13,96	3,34	5,50
50	4,74	76,14	10,45	42,82	13,76	3,67	4,47
Weight ratio of Bird droppings : Phosphorite = 100 : 20							
10	6,32	29,81	15,70	37,06	11,91	2,18	7,22
20	6,15	43,68	15,30	36,11	11,60	2,77	6,70
30	6,00	52,81	14,90	35,18	11,30	3,33	6,14
40	5,85	65,42	14,55	34,34	11,03	3,87	5,74
50	5,72	74,73	14,21	33,54	10,78	4,38	4,65
Weight ratio of Bird droppings : Phosphorite = 100 : 30							
10	7,19	28,44	18,83	31,23	10,03	2,12	7,31
20	6,96	42,05	18,22	30,22	9,71	2,86	6,78
30	6,73	50,98	17,64	29,25	9,40	3,56	6,23
40	6,53	61,89	17,12	28,38	9,12	4,21	5,96
50	6,35	72,65	16,63	27,57	8,86	4,84	4,82
Weight ratio of Bird droppings : Phosphorite = 100 : 40							
10	7,87	27,02	21,23	27,13	8,72	2,08	7,39
20	7,58	40,98	20,44	26,12	8,39	2,94	6,93
30	7,30	49,25	19,69	25,16	8,08	3,74	6,35
40	7,05	58,81	19,02	24,31	7,81	4,48	5,77
50	6,82	69,02	18,41	23,52	7,56	5,18	5,10

On the roentgenogram MM (Fig. 4.) the diffraction bands are 2,77; 2,74; 2,69; 2,62; 2,28; 2,24; 1,93; 1,83; 1,72; 1,72 Ao belong to fluorocarbonate apatite. The presence of calcite is confirmed by interplanar distances of 3,86; 3,03; 2,49; 2,28; 2,09; 1,92; 1,91; 1,87; 1,62; 1,60 Ao, dolomite – 1,54 Ao, gypsum – 3,07; 3,17; 2,77; 2,24; 1,42 AO, tricalcium phosphate – 3,45 AO. Bands 3,81; 3,35; 2,49; 1,93; 1,87 Ao indicate the presence in the FS of an insoluble residue - quartz.

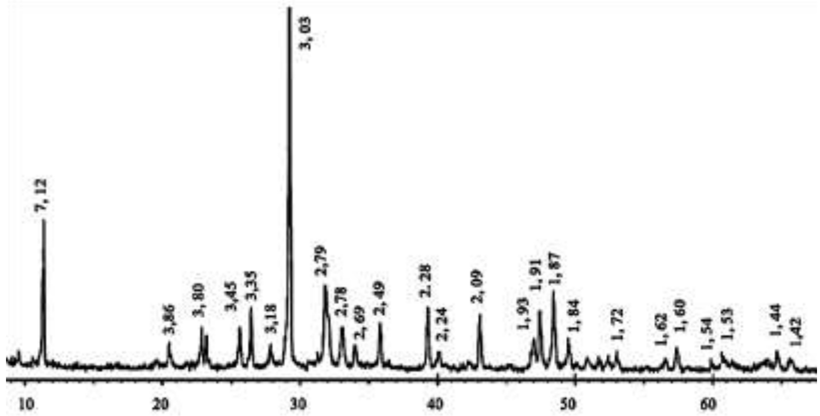

Figure 4: X-ray MM

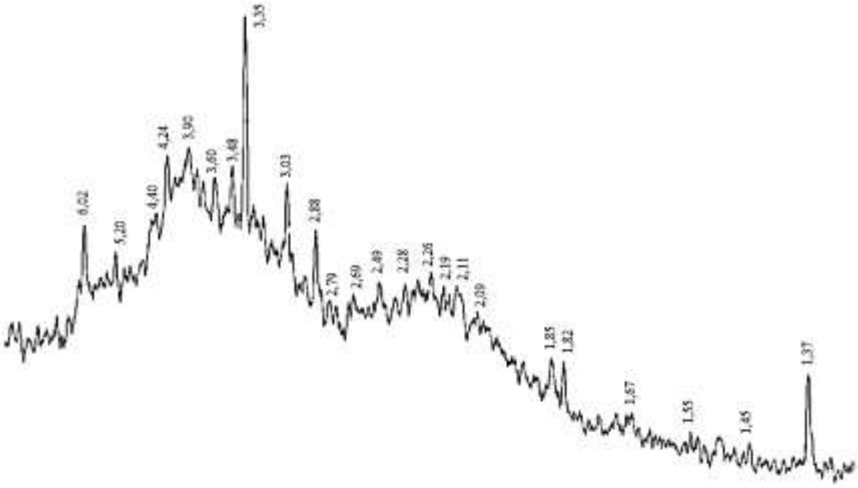

Figure 5: X-ray diffraction patterns of nitrogen-phosphorus-humus fertilizers based on MM.

In fig. Figure 5 shows X-ray diffraction patterns of a sample of nitrogen-phosphorus-humus fertilizer obtained by processing MM with an incomplete norm of nitric acid, i.e. 40% of stoichiometry and with the ratio of droppings to MM = 100:30. On the roentgenogram, bands 6,02 appeared; 1,90Ao, belonging to four-water calcium nitrate, intense bands of monocalcium phosphate (2,57; 2,11; 1,82Ao), dicalcium phosphate (7,62; 4,23Ao). The disappearance of peaks 3,86; 2,49; 2,28; 2,09; 1,87 AA compared with the initial MM shows its maximum decarbonization. The fertilizer also contains activated and undecomposed fluorapatite (2,79; 2,69; 2,62; 2,28; 1,83Ao).

Thus, the study convincingly shows that in poultry farms using a small amount of nitric acid, PP and MM can be intensively processed into high-quality nitrogen-phosphorus-humic fertilizers.

IV. CONCLUSIONS

Thus, the degree of decomposition of phosphate raw materials and the humification of organic substances during composting of livestock and poultry wastes with NFs were determined, and the chemical composition of the organomineral fertilizers obtained was determined based on the results physicochemical fundamentals and a rational technology for producing high-quality organomineral fertilizers are proposed. It is shown that the greater the dispersion of PS, the greater the relative content of the assimilable form of P2O5 in composts, an increase in assimilable forms of P2O5 due to the interaction of organic acids with phosphorites by 6,5-7,0 times, due to phosphates in composts, a decrease in nitrogen loss by 2, 4 times, organic substances by 3 times and an increase in the degree of humification of organic substances by 1,9 times. The possibility of obtaining organic fertilizer fertilizers by acidifying bird droppings with nitric acid and the subsequent decomposition of substandard phosphorites using nitric acid bird droppings is also shown.

In order to identify the agrochemical effectiveness of new forms of phosphorus-containing composts in the years 2017 and 2018. At the experimental site of the Research Institute of Breeding, Seed Production and Agricultural Technologies for Cotton Growing, a pilot batch of WMD of 500 kg was prepared for agrochemical tests. It has been established that when phosphorus-containing compost obtained on the basis of MM and manure is introduced, comparatively optimal conditions are created in the soil not only for phosphorus but also for nitrogen in plants, in which the nutrient supply to the organs of cotton is improved. Over the years of conducting agrochemical tests, a relatively high yield of raw cotton (40,6 c/he) was observed with an increase of 4,0 c/he (control option) when making (10 t/he) compost, 0,2 c/he more in comparison with the option where phosphorus was introduced as part of standard fertilizers (100 kg/he) and manure (20 t/he). Based on the experiments and tests, temporary recommendations have been prepared on the preparation of composts based on cattle manure and substandard phosphorites and their use in agriculture.

REFERENCES

1. Ivanov V.M. Humus: the basis of fertility//AgroONE. 2018, №24, -pp.12-13. (in Ukraine).
2. N.G. Kovalev Modern problems of the production and use of organic fertilizers // Bulletin of the All-Russian Scientific Research Institute of Animal Husbandry Mechanization. 2013 № 2 (10). № 82-92. (in Russian).
3. Zakorchevny II, Mikhalskaya LN, Schwartau VV Humic substances and fertilizers based on them // Soil knowledge. 2012. № 1. Pp 60-76. (in Russian).
4. Moskalenko T.V., Mikheev V.A., Vorsina E.V. Artificially obtained humic substances for soil restoration // Achievements of modern natural sciences. 2018. № 1. Pp 109 -114. (in Russian).
5. Khayriddinov AB, Raupov B., Boboev F. Soil fertility of Uzbekistan // International scientific journal "Symbol of Science". 2017. № 06. Pp 51-53. (in Russian).
6. Rasulov A. A., Alimov U. K., Seytnazarov A. R., Namazov Sh. S., Sultonov B. E. Production of NP fertilizers based on the decomposition of poor phosphates using a mixture of phosphoric and sulphuric acids // Journal of Chemical technology and Metallurgy. - Sofia, 2019. – Volume 54, Issue 6 pp. 1263-1270. (in Bulgaria).
7. Sh.Yu.Nomozov, Sh.S.Namazov, A.R.Seytnazarov, B.M.Beglov, U.K.Alimov. Balanced NP- And NPK-Fertilizers Based On Purified Ammophos Suspension, Nitrogen Fertilizers And Potassium Chloride. International journal of scientific & technology research. –India. - Volume 9, Issue 02 pp. 1572 - 1578. (in India).
8. Bobokhodzhaev I. Humus and soil fertility // Agriculture of Uzbekistan. - 1992. - No. 8-9. - S. 15-16.
9. Derzhavin L.M., Sedova E.V. On the reproduction of humus // Agrochemistry. - 1988. № 9. Pp 117-127.
10. N.H. Usanbaev, Sh.S. Namazov, B.M. Beglov Process flowsheet and optimal regime of phosphorus humus containing fertilizers production based on central Kyzylkum phosphorite and oxidized brown coal from Angren // European Applied Sciences. - 8, 2015, 53-57. (in Russian).

11. Zhumanova M.O., Namazov Sh.S., Beglov B.M. Organomineral fertilizers on the basis of ammophosic pulp and oxidized brown coal of the Angren deposit // Chemical Industry. - St. Petersburg - 2011, t. 88, № 5, pp 217-222. (in Russian).
12. Zhumanova M.O., Temirov U.S. Sh., Namazov Sh.S., Beglov B.M. Physical and chemical and commercial properties of organomineral sulfur-containing fertilizers based on oxidized brown coal and phosphogypsum // Chemical journal of Kazakhstan, 2015, № 3 , pp 52-57. (in Kazakhstan).
13. Zhumanova M.O., Sh. Namazov, B. Beglov, O. Myachina, M. Tashquziev Influence of organic and organic-mineral fertilizers on the fertility of soils // Sofia. Journal of Chemical Technology and Metallurgy, 50, 3, 2015, pp 282-287. (in Bulgaria).
14. Usanbaev N.Kh., Namazov Sh.S., Babaev S.K., Seitnazarov AR, Beglov BM, Agrochemical tests of organomineral fertilizers obtained on the basis of nitric acid processing of brown coal and phosphorites in winter crops wheat in Uzbekistan // Agricultural chemistry (Moscow). 2017, №. 3, pp. 27-32. (in Russian).
15. Popov P.D., Khokhlov V.I., Egorov A.A. and other organic fertilizers. Reference // M .: Agropromizdat, 1988. pp 62-63.
16. Zhukov A.I. Reproduction of humus in intensive farming // Agrochemistry. 1991. № 3. pp 121-133. (in Russian).
17. Derzhavin L.M., Polyakov A.N., Florinsky M.A. and others. Humus content in arable soils of the USSR // Chemicalization of agriculture. 1988. № 6. pp 7-8. (in Russian).
18. Ivanova S.E., Loginova I.V., Tandell T. Phosphorus: mechanisms of losses from the soil and methods for their reduction // Plant Nutrition: Bulletin of the International Plant Nutrition Institute, 2011, № 2. pp 9-12. (in Russian).
19. Levin B.V., Ozerov S.A., Garmash G.A., Latina N.V., Garmash N.Yu. Improving the agrochemical effectiveness of complex phosphorus-containing fertilizers due to humate additives // Plant Nutrition: Vestnik Me 2019. V. 8. № 12.pp 2260-2265. (in Russian).
20. Shevtsova L.K., Volodarskaya I.V. The effect of prolonged use of fertilizers on the balance and quality of humus // Chemicalization of agriculture. – 1991. - № 11. – pp. 97-101. (in Russian).
21. U.Sh.Temirov, A.M.Reymov, Sh.S. Namazov, N.H. Usanbaev, Seytnazarov A.R. Organic-mineral fertilizer based on cattle manure and sludge phosphorite with superphosphate. // International Journal of Recent Advancement in Engineering & Research. Volume 04, Issue 01. India. – January – 2018 – pp. 39-46. (in India).
22. U.Sh.Temirov, Sh.S. Namazov, N.H. Usanbaev, B.E.Sultonov, A.M.Reymov. Organic-mineral Fertilizer Based on Chicken Manure and Phosphorite from Central Kyzylkum // Chemical Science International Journal. Volume 24, Issue 3. USA. – 2018. – pp. 1-7. (in USA).
23. Shafoat Namazov, Uktam Temirov, Najimuddin Usanbayev. Research of the Process of Obtaining Organo-Mineral Fertilizer Based on Nitrogen Acid Decomposition of Non-Conditional Phosphorites of Central Kyzylkumes and Poultry Cultivation Waste//International Journal of Innovative Technology and Exploring Engineering (IJITEE). Volume-8 Issue-12. – 2019. – pp. 2260-2265. (in India).
24. Doniyarov Nodirjon, Temirov Uktam, Usanbaev Najimuddin, Asvorov Anvar, Murodov Islom, Tagaev Ilxam, Khusenov Kakhramon. Organomineral Fertilizers Based on Sediments of Waste Water and Mineralized Mass of Phosphorites of Central Kysylkum//Test Engineering & Management. Volume-82 January-February. – 2020, – pp. 15839 – 15847. ISSN: 0193-4120 (in USA).