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INFLUENCE OF THE EROSION PROCESS ON NUTRIENT DECREASE IN THE PSEVDOPODZOLIC-YELLOW SOILS OF THE LANKARAN REGION

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In article the psevdopodzolic-yellow soils,occuring erosion processes, an influence of erosion process on decrease of nutrient in the Lankaran prvince were investigated. It is known that a quantity of either nitrogen ammoniac or nitrate forms in the investigative soils was most in May. Absorbed ammoniac was 24,90 mg/kg, ammoniac dissolved in water was 9,13 mg/kg, nitrates 6,73 mg/kg in May; 20,53, 7, 87, 4,94 mg/kg in July and 12,74, 5,43 and 3,63 mg/kg in September on 0-30 cm of the layer in uneroded psevdopodzolic-yellow soils in 2009. A quantity of mobile phosphorus on 0-30 cm of layer in uneroded soils in a spring season of the research years (in May) was 22,86-31,57 mg/kg; 18,77-27,58 mg/kg in July; 17,38-24,05 mg/kg in September; in a kind of middle eroded kind it was 15,45-20,53; 10,58-17,03 and 11,00-15,20 mg/kg.The performed researches show that a quantity of the exchaning potassium on 0-30 cm of layer in uneroded psevdopodzolic-yellow soils was 171,03-175,84 mg/kg in May of the research years (in spring); 149,03-159,29 mg/kg in July; 124,76-138,57 mg/kg in September. A quantity of exchangeable potassium in the average-eroded soils was 79,47-88,27 mg/kg in May, 67,75-81,67 mg/kg in July, 61,71-74,68 mg/kg in September. According to 3-year research consequences we can say that each of the nutrient decre-ased to a considerable degree.Amain reason is exopsing of the soils to erosion process, assi-milation of the nutrient by plants, not-applying of the adrotechnical rules correstly and in time.

INTRODUCTION

Psevdopodzolic-yellow soils spread in the ancient accumulative foothill plains, flat and inclined terraces province . The same soils are bounded in the low upland and foothill places by mountain-forestry yellow soils but on the left and right parts near the Lankaranchay basin by the irrigative gleyey-yellow soils. A total area of the psevdopodzolic-yellow soils is 28980 hectares in the Lankaran natural province. Psevdopodzolic-yellow soils are one of the cultural soils being used in the province agriculture. The foothill-plain part in the cutting forest is used under agriculture plants at present, tea, feykhoa from subtropic plants and orange, tangerine, lemon and other from citrus plants are planted in psevdopodzolic-yellow soils which are became humid by surface flow on the right bank of the Lankaranchay basin in these zones.

RESULTS AND ANALYSIS

The erosion, stream and landslide phenomenon are widely spreaded as a result of expanding of the deforested zone borders and in this connection the strong changes occured on soil cover of the province [1,2].

Besides it an effect of the zone climate condition on agrosystems, including on soil ecosystem is very complicated and different. The air high temperature reduces the soil fertility, a probability of vermins and illness increases besides by intensifying naturally smashing of the steppe soil organic substances being cleared from the soil, an existence of the mountain rivers, often repetition of the seasonal rains are a reason for occuring of the stream phenomenon, at the same time we should note that an erosion process is one of the main reasons for being in unfit state [3].

Erosion occurs as a result of the mutuol effect of the natural and antropogen factors. Therefore morphological signs, waterphysical, physico-chemical and agrochemical characters of soils deteriorate . That´s why an effect of the antropogen and natural factors on erosion and an effect of erosion degree on increase of the production ability and plants productivity of soils should be taken into account.

In this connection the preparation of the scientific bases of its protection and improvement, rational use from soil are actual scientific and practical problems at present.

It is known the important nutrient is also leached for soil fertility as a result of the erosion process, therefore the productivity reduces.

Getting of the constant and high qualitative products from the cultural plants depends on a quantity of the nutrient assimilating forms in soil. As a quantity of the nutrient assimilating forms is used by the plant, it can be lost by leaching from the zone with the root system into law layers. This occurs under the condition of the mutual effect of the natural and antropogen factors, soils degradation during plant vegetation period. The erosion process reduces not only the potential resource of the nutrient total form but also their absorbability forms. One of the main problems is definition of the mobile nutrient in soil in a study of soil fertility.

The total reserve and quantity of the absorbability nutrient in the different soils aren□t equal depending on soil structure and property. That´s why the mobile forms of nitrogen, phosphorus and potassium were learnt in the kinds of uneroded and eroded to an average degree of psevdopodzolic-yellow soils in a comparative form in dynamics in the spring (may), summer (juli), autumn (september) seasons of 2009-2011 years. Our researches approved exposing of the investigated soils to important changes as a result of both natural and antropogen effects in a space and time and reduction of the nutrient assimilating forms quantity.

A quantity of the mobile nitrogen combinations (N/NH3+N/NO3) in soil changes depending on plants development stages and year seasons (nitrification, amonofication and other biological process). Only nitrogen from the main nutrient in soil is lost. In connection with the condition it is lost from soil into atmosphere as elementary, oxides and ammoniac form.

Nitrogen loss in elementary and oxygenic combinations form occurs under the condition of superiority denitrification than nitrification process. Under the condition of rainfalls superiority than evaporation and especially loss of soil and fertilizer nitrogen as a gas state under the denitrification effect is observed in the acid and weak acid soils. Because of being the most mobile nitrogen nitrate combination from nutrient the nitrogen loss from soil occurs at expense of this combination.

Preservation of the nitrogen, phosphorus and potassium quantity in any correlation in soil is one of the main factors which increase the crop and improve its quality. That´s why a quantity of the nutrient assimilating forms in soil must be taken into account.

The experiment shows that easily absorable combinations of nitrogen in soil reduced very much over the seasons at the end of vegetation period because of nitrogen dynamic and high assimilating coefficient in the un eroded, and eroded psevdopodzolic-yellow soils to an average degree.

It is known that a quantity of either nitrogen ammoniac or nitrate forms in the investigative soils was most in May. Absorbed ammoniac was 24,90 mg/kg, ammoniac dissolved in water was 9,13 mg/kg, nitrates 6,73 mg/kg in May; 20,53 , 7,87 , 4,94 mg/kg in July and 12,74 , 5,43 and 3,63 mg/kg in September on 0-30 cm of the layer in uneroded psevdopodzolic-yellow soils in 2009 (table 1) On 0-30 cm of layer in eroded soils to average degree in comparison with uneroded soils ammoniac was 13,55 mg/kg (11,35 mg/kg little) NH3 dissolved in water was 5,55 mg/kg (3,58 mg/kg little), nitrates NO3 was 4,01 mg/kg (2,75 mg/kg little), absorbed NH3 was 10,51 mg/kg in July (10,02 mg/kg little), NH3 dissolved in water was 4,24 mg/kg (3,63 mg little), nitrates NO3 was 2,98 mg/kg (1,96 mg/kg little), absorbed ammoniac in September was 5,94 mg/kg (6,80 mg/kg little), ammoniac dissolved in water was 3,16 mg/kg (2,27 mg/kg), nitrates was 2,08 mg/kg (1,55 mg/kg little) (table 1).

Gathering of the green tea leaf crop in the tea plantations of the Lankaran province foothill zones is a reason for nitrogen mobile forms in May and July (green tea leaf gathering in May), this gathering falls on the first ten days that's why nitrogen maximum assimilation happens at the same period (at the plant vegetation period).

A reason of the nitrogen assimilating forms reduction in these soils can be explained by assimilating of the nutrient by plants and pulled out from the area by the crops and washing out by an artificial irrigation and atmospheric residues. As is obvious from Table 1 that reduction of the nitrogen assimilating forms from the initial soil samples (the soil samples taken in May every year) taken from 0-30 cm of layer in the soils eroded to an average degree in comparison with uneroded soils changed by 15,76-18,69 mg/kg.

One of such reduction of the mobile nitrogen combinations (N/NH3+N/NO3)

quantity is exposing of soils to erosion process. Because, the slope inclination effects on formation of the erosion process and development on the mountain slopes, while the slope inclination increases a rate and destructive force of the surface water stream when it rains rise. The surface stream accelerates the soil intensive leaching and consequently loss of the nutrient, including nitrogen mobile forms occurs.

Phosphorus also forms a part of the vivacious cell as nitrogen. One of the main roles of phosphorus in plant life participates in its synthesis, respiration and fermenting processes. After assimilating of phosphorus element by plant, it penetrates (passes) into phosphorus different combinations form in the plant organism. Phosphorus in the plant organism is in mineral and organic combination form and plays a main role in food exchange. Phosphorus mobile forms are little in soils.

Mobile phosphorus is absorbed by the soil silt fractions and gathers in soil upper layers. As a result of erosion process the silt fraction loss reduces the mobile phosphorus quantity [4].

There is both practical and theoretic importance of the mobile phosphorus quantity study. The phosphorus forms were investigated under tea-plant in psevdopodzolic soils of the Lankaran province.

It was known that a quantity of the lost mobile phosphorus in uneroded psevdopodzolic soils (on 0-30 cm of layer) changed in undertea soils depending on year seasons in research years. A maximum quantity of mobile phosphorus was in a spring season.

So, a quantity of mobile phosphorus on 0-30 cm of layer in uneroded soils in a spring season of the research years (in May) was 22,86-31,57 mg/kg; 18,77-27,58 mg/kg in July; 17,38-24,05 mg/kg in September; in a kind of middle eroded kind it was 15,45-20,53; 10,58-17,03 and 11,00-15,20 mg/kg (Table 2).

The exchangeable potassium on the tillage layer of the uneroded and average-eroded kinds of the psevdopodzolic soils was investigated in dynamics.

If the plant is provided with the potassium the photosynthesis process goes quickly. While the plant is provided with potassium well then nitrogen can be assimilated well [5].

While the tea plant bushes are provided with potassium well, much carbon gathers in the cells and the plant suffers the frost.

The third main nutrient of the plant potassium total quantity is more than a quantity of nitrogen with phosphorus. Although a quantity of potassium in soil is more, but there is a strong need to potassium for yielding of the plants highly in many soil types.

Because the potassium combinations are in a hard-assimilating form. As a result of the research it was determined that though hard-dissolving potassium combinations pass into easy-assimilating form, at the same time the dissolving in water, assimilating and exchangeable form of potassium is absorbed by the soil particles.

Table 1. *A quantity of nitrogen assimilating forms in psevdopodzolic-yellow soils, mg/kg (in dynamics)*

Section №	A date of taking sample	Eroding degree	Depth, cm	May (spring)			July (summer)			September (in autumn)		
				Absorbed N/NH_3	Dissolvin g in water N/NH_3	N/NO_3	Absorbed N/NH_3	Dissolving in water N/NH_3	N/NO_3	Absorbed N/NH_3	Dissolving in water N/NH_3	N/NO_3
11	2009	Uneroded	0-10	36,60	12,90	8,80	29,60	10,30	6,36	16,30	5,35	3,50
			10-20	24,70	9,20	6,30	21,40	8,20	5,65	15,25	6,15	4,60
			20-30	13,40	5,30	5,10	10,60	5,10	2,80	6,68	4,80	2,80
			0-30	24,90	9,13	6,73	20,53	7,87	4,94	12,74	5,43	3,63
12		Average eroded	0-10	16,10	7,25	6,28	14,38	5,26	5,20	8,55	3,50	2,10
			10-20	18,45	5,50	3,15	12,85	4,38	2,35	6,36	3,38	2,85
			20-30	6,10	3,90	2,60	4,30	3,08	1,38	2,90	2,60	1,30
			0-30	13,55	5,55	4,01	10,51	4,24	2,98	5,94	3,16	2,08
13	2010	Uneroded	0-10	32,10	10,30	8,50	25,50	9,60	5,60	14,30	4,80	2,95
			10-20	22,63	8,65	6,00	18,46	7,40	3,80	13,80	6,00	3,10
			20-30	10,40	4,98	4,40	9,30	4,30	2,88	5,30	3,60	2,15
			0-30	21,71	7,98	6,30	17,75	7,10	4,09	11,13	4,80	2,73
14		Average eroded	0-10	15,50	6,60	6,80	13,30	5,20	5,06	7,38	3,10	1,08
			10-20	13,85	4,26	3,55	12,60	3,45	2,20	5,15	2,95	2,08
			20-30	5,80	2,30	2,00	4,20	2,95	1,10	2,10	2,08	1,04
			0-30	11,72	4,39	4,12	10,03	3,87	2,79	4,88	2,71	1,40
15	2011	Uneroded	0-10	34,50	11,84	8,90	32,30	10,10	6,00	15,60	5,20	3,40
			10-20	24,05	9,90	6,20	21,09	9,80	4,75	16,59	6,15	4,52
			20-30	12,80	5,80	4,75	10,20	5,30	2,98	6,55	4,60	2,36
			0-30	23,78	9,18	6,62	21,20	8,40	4,58	12,91	5,32	3,43
16		Average eroded	0-10	16,08	6,90	5,00	15,38	5,18	3,65	8,00	3,30	1,90
			10-20	14,25	4,45	3,38	13,25	4,50	2,48	5,60	3,45	1,40
			20-30	6,05	3,75	2,80	6,60	2,30	1,70	3,60	2,40	1,10
			0-30	12,13	5,03	3,73	11,74	3,99	2,61	5,73	3,05	1,47

Table 2. *A quantity of mobile phosphorus and exchangeable potassium, mg/kg (in dynamics) in the psevdopodzolic-yellow soils*

A number of sections	Sample-taking date	Eroding degree	Depth, cm	Mobile phosphorus (P_2O_5)			Exchangeable potassium (K_2O)		
				May (Spring)	July (Summer)	September (Autumn)	May (Spring)	July (Summer)	September (Autumn)
11	2009	Uneroded	0-10 10-20 20-30 0-30	33,20 30,30 31,20 31,57	28,10 29,15 25,50 27,58	26,50 25,15 20,50 24,05	179,00 172,13 176,40 175,84	176,68 155,45 145,75 159,29	150,43 145,04 120,25 138,57
12		Eroded to an average degree	0-10 10-20 20-30 0-30	20,50 21,80 19,30 20,53	17,40 19,10 14,60 17,03	15,60 16,70 13,30 15,20	91,12 85,40 88,28 88,27	83,25 75,30 86,45 81,67	78,05 63,85 82,15 74,68
13	2010	Uneroded	0-10 10-20 20-30 0-30	23,33 24,25 21,00 22,86	20,50 19,10 16,70 18,77	18,65 18,20 15,30 17,38	172,36 163,31 180,40 172,02	152,38 140,40 154,30 149,03	130,38 132,95 136,31 133,21
14		Eroded to an average degree	0-10 10-20 20-30 0-30	14,85 16,30 15,20 15,45	12,15 10,30 9,30 10,58	11,60 10,20 11,20 11,00	86,08 74,19 78,15 79,47	70,50 64,46 68,30 67,75	66,72 58,15 60,25 61,71
15	2011	Uneroded	0-10 10-20 20-30 0-30	30,75 32,30 29,60 30,88	28,65 26,40 23,30 26,12	25,50 23,10 21,40 23,33	172,45 168,58 172,05 171,03	162,08 154,64 145,08 153,93	130,45 115,32 128,50 124,76
16		Eroded to an average degree	0-10 10-20 20-30 0-30	16,10 18,30 19,25 17,88	15,60 13,30 10,05 12,98	14,20 12,30 9,40 11,97	88,25 77,30 83,65 83,07	78,30 68,28 76,35 74,31	68,60 60,58 64,25 64,48

Absorbable potassium connects with the mechanical structure of soil, its silt fraction. Exchangeable potassium is absorbed by soil silt particles and gather on its upper layers. Potassium absorbing in soil is staight proportion with the temperature increase [6]. At the same time absorbtion occurs in the soil possessing much fertile, but its effect is weak. Formation of the erosion process is closely connected with rainfalls. During water erosion the ordinary surface water flow washes out the silt fraction and reduces exchangeable potassium quantity.

CONCLUSION

The performed researches show that a quantity of the exchaning potassium on 0-30 cm of layer in uneroded psevdopodzolic-yellow soils was 171,03-175,84 mg/kg in May of the research years (in spring); 149,03-159,29 mg/kg in July; 124,76-138,57 mg/kg in September. A quantity of exchangeable potassium in the average-eroded soils was 79,47-88,27 mg/kg in May, 67,75-81,67 mg/kg in July, 61,71-74,68 mg/kg in September.

We can say on the basis of 3-year research that some important changes in these soils occur as a result of the mutual effect of the natural and antropogen factors, each of the nutrient decreased to a considerable degree. This requires importance of the rational use from soils.

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ВЛИЯНИЕ ПРОЦЕССА ЭРОЗИИ НА УМЕНЬШЕНИЕ ПИТАТЕЛЬНЫХ ВЕЩЕСТВ В ПСЕВДОПОДЗОЛИСТЫХ-ЖЕЛТЫХ ПОЧВАХ ЛЕНКОРАНСКОГО РЕГИОНА

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Представлены результаты исследования псевдоподзолистых-желтых почв Ленкоранской области, процессов эрозии, влияния эрозии на уменьшение питательных веществ в почвах. В почвах содержание как аммиачной, так и нитратной форм азота в мае было больше всего. В слое 0-30 см почвы не подверженной эрозии содержание поглощенного аммиака составило 24,90 мг/кг, водорастворимого аммиака - 9.13 мг/кг, нитратов - 6.73 мг/кг; в июле - 20.53; 7.87; 4.94 мг/кг; а в сентябре - 12.74; 5.43 и 3.63 мг/кг, соответственно. В средней степени эродированных почв эти показатели колебались в следующих пределах: 15.45-20.53; 10.58-17.03 и 11.00-15.20 мг/кг. В 0-30см слое неэродированных почв содержание обменного калия по годам исследований в мае месяце менялось в пределах 171.03-175.84 мг/кг; в июле - 149.03-159.29 мг/кг; а в сентябре - 124.76 - 138.57 мг/кг. В почвах же средней степени эродированности содержание обменного калия в мае месяце составляло 79.47-88.27мг/кг, в июле уменьшилось до 67.75-81.67 мг/кг, а в сентябре - до 61.71-74.68 мг/кг. 3-х летние исследования показали, что содержание каждого из питательных элементов уменьшается. Основная причина заключается в подверженности почв процессу эрозии, выносе растениями питательных элементов, неправильном применении агротехнических мероприятий и др.