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Theoretical and practical importance of ecological fertility models of soils

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Abstract
It is started about theoretical and practical importance of ecological fertility models of soils in the Nakhchivan Autonomous Republic. In the main content of the work ecological factors influencing to the productivity of domestic and natural plants in autonomous republic condition were taken into account, fertility model of soils were made.
At the result theoretical and practical importance of fertility models made for profitable use under cultural and natural plants in the Autonomous Republic were noted.

Keywords: model of fertility, geographical factors, ecogeography, soil, saltiness, erosion, ecological estimation of soil

Introduction

The main problem of soil science in present period is to make theoretical and practical importance of fertility models made in the territory for profitable use of soils under cultural and natural plants. For making theoretical and practical importance of fertility models in the territory firstly ecological factors influencing the productivity of cultural and natural plants should be searched completely. In this situation the required issue is to register parameters of the searched objects for concrete arrangements of controlling soils fertility and optimizing of plants growing condition in agrarian sector. All these helps to make agro ecological model of soil fertility in any case.

Material and Method

On the world scale and also in Azerbaijan theoretical and practical importance of fertility models were sufficiently studied by (Shishova 1982, Mammadov 1985, Stepanov and Luchiskaya 1985, Burlakova, Rasipnov, Ojgibitseva1986, Kulakovskaya, Bogdevich 1982, Shishov, Karmanov, Durmanov1987, 1991, Korablyova and Slutskaya 1992 and so on. Methodological suggestions of N. N. Razov, D. S. Bulgakov, N. N. Vadkovskaya (1984), G. S. Mammadov (1999-2000) on choosing these indicators and the role of separate factors of fertility formation in cultural and natural fields were taken into account.
Fertility models of soils of the Azerbaijan Republic was first prepared on the base of ‘’Complex agronomic character of soils, of I.I. Karmanov (1982) by G. Sh. Mammadov in 1985.
As a research object all soil types and subtype were taken. Literature field materials concerning to the work were collected and methods of work was prepared. While carrying work on fertility model monography, methodic aids, map materials and work practice meeting modern requirements of so called scientists carrying research works on protecting soil fertility in separate development stages of history abroad also in Azerbaijan and Nakhchivan Autonomous Republic were used [4, 5].
Together with literature materials for carrying research work special attention was given to the field materials collection. For this purpose for studying environment of the autonomous republic expeditions were organized on different directions of research object.

Experimental Part

Preparation of theoretical and practical importance of soil fertility models is important for autonomous republic farmings too. It is connected with learning of the region from agrarian point of view, variety of professionalism, necessity of gaining high productivity of cultural and natural plants [1, 2, 3, 6].
Fertility-is a capacity of soil for ensuring plant with food elements, water, enough air and heat for root system. For L.L. Shishova (1982) giving definition to the soil fertility model having importance from agronomic point of view that corresponds to the definite levels of plant productivity gives a chance of making models (conceptual, mathematical, regional and so on) for different levels of fertility. The model we made is simple that arranges first stage (on conceptual level) of mathematical and regional models. Here most materials are of statistic and examination kind. If we take into account that fertility is the urgent quality sign of soil on the basis of its parameters it is possible to make fertility models of separate soil types and subtypes under different plants.
The carried soil-agroecological researches and analysis of natural condition of separate areas and investigation of news give a chance to make fertility models for different soils depending on fodder crop, corn, grape, vegetable and other plants need.
Soil-being indicator of fertility system blocs of agroecological models of soils for separate plants are made of its indices. Models prepared in autonomous republic condition, so called indicators due to the fertility controlling importance in field farming system on natural zones were consulted to connect in 8 blocs (agroecology, soil structure, soil regimes, soil properties, estimation, biometry, agromelioration, monitoring). For this purpose in organizing fertility models in definite zonal soils of Nakhchivan Autonomous Republic on the basis of liturature sources, in accordance with present need, using the above mentioned 8 blocs, fertility models parameters applied in the soils of our country by academician G. Sh. Mammadov (2000) from our side were used.

On the basis of carried researches in different soil-climate zones of Autonomous Republic 4 fertility models were made under cultural plants (fodder-clover, corn-wheat for autumn, grape-Hanagirna and vegetable-Volgagrad type of tomato).
From our side in making fertility model under any plant soil types and subtypes fiting they were chosen in comparison. In this article let's take into consideration only fertility model under fodder crop (Clover Nakhchivan-5 sort). For making fertility model under clover 2 soil types (grey and brown) were chosen.

Let's firstly pay attention signs of brown soils due to the below mentioned blocs under fodder plant (clover Nakhchivan-5 sort). While making fertility model of brown soils under clover plant areas spreading in the west part of the Boyukduz village, Kangarli region.
Fertility model under fodder plant (clover Nakhchivan-5 sort).

1) Agro ecological bloc; Relief condition plain; active radiation for photosynthesis (ARPh) 46-48 (kkal/sm2); continental coefficient (CC) 0,8-0,9; humidity coefficient (HC) 0,19-0,25; rains (mm) 220-230; effective temperature ET> 100 C -3500-4200; number of no frosty days 270-310; average yearly absolute maximum 350C, average yearly absolute minimum180C,vegetation period (day) 90-100; thickness of snow coverlet 15-25 sm, general evaporation 1200-1400mm/year.
2) Agrophysical bloc: Thickness 0, 7-1,5 g/sm3. Special weight g/sm3 2,64-2,71; porosity 41-53%, CO2 with% (per cent) 2,5-5,5; water solidity agregats (>0,25mm,%) 20,0-40,0; physical clay (<0,01mm, %) 30,0-55,5; silt fractions (<0,001mm,%) 20,0-40,0; water conducting 70-120 mm/h.
3) Structure and properties of soil blok: Amount of humus 1,2-2,0%; reserve of humus t/ha (0-100sm) 132-299; C/N 6-10; general nitrogen 0,07-0,17%; general phosphorus 0,11-0,18%; general potassium 1,0-2,2%; TNO (total number of obtained) mg-ekv/100gr 12,2-26,2; amount of carbonats(CaCO3) 3,5-9,6%; hard residium of water dissolve salts 0,08-0,17%; pH (water) 7,6-8,7.
4) Agrochemical properties bloc:-ammount of N/NO3+ N/NH4 mg /kg 8,0-20,0; mobile phosphorus mg/kg 13,0-20,0; exchagable potassium mg/kg 171-300.
5) Bloc of soil nonvertebras: Amount of general organisms in civilized 0-20 sm soil layer. (in 1 gr absolute dry soil in thousand unit) 4801-6753.
6) Biometry and productivity bloc: Root system 110-170sm; productivity wet weight 30-40s/ha, dry weight 15-20s/ha, fodder unit 6, 0-8, 2.
7) Estimation bloc: Due to the fertility signs of soils 54-72 point; soil ecological index (SEI) 60-76.
8) Agromelioration bloc: Organic fertilizers deluvering 30-40 t/ha, mineral fertilizers delivering, phosphorus 150-160 kg/h; potassium 50-60kg/h; general irrigation norm 1200-1800 m3/ha; number of irrigation 4-5 and norm 300-400m3/ha.

Let's look through the fertility model of brown (chestnut) soils under fodder plant (clover Nakhchivan -5). For making fertility model of brown (chestnut) soils under fodder plant soils spreading in "Nabatat" experimental area located on the right bank of Nakhchivanchay.

Fertility model of brown (chestnut) soils under fodder plant (clover Nakhchivan-5 sort).

1) Agroecological bloc: Relief condition foothills and inter mountain hollows of low mountain,active radiation for photosynthesis (ARPh) 41-44 kkal/sm2; continental coefficient (CC) 0,7-0,8; humidity coefficient (HC) 0,21-0,27; rains (mm) 230-350; effective temperature ET>100C, 3300-4000; number of nonfrosty days 250-300; average yearly absolute maximum 30-350C; average yearly absolute minimum 17-180C; vegetation period(day) 80-90; thickness of snow coverlet (sm) 20-30; general evaporation (mm/year)1100-1300.
2) Agrophysical bloc: Thickness 1,9-1,3g/sm3; special weight g/sm3 2,46-2,58; general porosity 42-65%; CO2 with % (per cent) 1,2-3,0; water solidity agregates (>0,25 mm, %) 30-60; physical clay (<0,01 mm, %)-43-60, silt fractions (<0,001mm, %) 19,2-27,0; water conducting 90-160 mm/h
3) Structure and properties of soil bloc: Amount of humus 1,8-3,9 %, reserve of humus t/ha (0-100 sm) 240-520; C/N 6-12; general nitrogen 0,12-0,20%; general phosphorus 0,11-0,22%; general potassium 1,4-2,4%; TNO (total number of obtained) mg/ekv/100gr 16,2-35,0; amount of carbonats (CaCO3) 3,6-9,7%; hard residium of water dissolve salts 0,07-0,14%; pH(water) 7,3-8,6.
4) Agrochemical properties bloc: amount of N/NO3+N/NH4 mg/kg 15,0-30,0; phosphorus (mobile), mg/kg 13,0-25,0; potassium (exchagable) 180-360 mg/kg.
5) Bloc of soil nonvertebras: Amount of general organisms in civilized 0-20 sm soil layer.(in 1gr absolute dry soil in thousand unit) 4331-5478.
6) Biometry and productivity bloc:-Root system 100-150sm, productivity wet weight 40-50 s/ha; dry weight 20-25 s/ha, fodder unit 8,2-10,5.
7) Estimation bloc:-Due to the fertility of soils 66-80 point, soil ecological index (SEI) 72-85.
8) Agromelioration bloc: Giving organic fertilizers 30-20 t/ha, giving mineral fertilizers, phosphorus 140-150 kg/ha; potassium 40-50 kg/ha; general irrigation norm 900-1600 m^3/ha; quantity of irrigation 3-4 and norm 400-300 m^3/ha.

As a result (Clover Nakhchivan-5 sort) under fodder plants of autonomous republic the male fertility models blocs in 2-grey and brown soil types indicators were analysed and generalized as a following table (Table).

Actual and optimal signs of soils under fodder plant
(Clover Nakhchivan- sort).

Parameter of soils	Signs of grey soils			Signs of brown (chestnut)		
	Optimal	actual	distinction	Optimal	actual	distinction
Humus with percent (%)	1,8	1,4	0,4	2,9	2,3	0,6
General nitrogen with (%)	0,13	0,09	0,04	0,17	0,14	0,03
General potassium with (%)	1,9	1,4	0,5	2,2	1,8	0,4
General phosphorus with (%)	0,15	0,13	0,02	0,20	0,17	0,03
$N/No_3+N/NH_4$ mg/kg	15,0	14,2	0,8	25,0	17,3	7,7
Mobile P_2O_5 mg/kg	16,0	16,5	-0,5	20,0	14,5	5,5
Exchangeable K_2O mg/kg	275	197	78	350	290	60
Physical, clay with (%)	52,5	34,5	18	55,0	48,0	7,0
Silt part with (%)	34,5	26,2	8,3	24,0	21,2	2,8
Water solidity agr. (>0,25mm, %)	37,5	30,0	7,5	45,0	35,0	10,0
Thickness, g/sm^3	1,0	1,3	0,3	1,0	1,2	-0,2
Total number of abtained coefficients mg. ekv. 100 qr	24,0	16,8	7,2	30,0	24,5	5,5
Porosity with (%)	49,0	46,0	3,0	61,6	50,0	11,6
Water conduction mm/h	114	76	38	144	96	48
CO_2 with (%)	5,0	3,5	1,5	2,5	1,5	1,0

At the result it is cleared from the analysis of the noted figures in made of us fertility model on the basis of 2 soil types (grey and brown) indicators under fodder crops (Clover Nakhchivan-5 sort) for restoring soil fertility in separate blocs differences between actual and optimal indicators were defined ways for increasing productivity of this plant were stated.

Results

As a result of application optimal model made in grey soils under fodder plant (Clover Nakhchivan-5 sort) have 90 manats economic effectiveness in comparison with actual model, in brown soils 100 manats economic effectiveness. In future researches in this field should be extended.

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