ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 3 , March 2020

Improvement Effectiveness of Soil Quality Index Assessment in Irrigated Areas

Karimov Erkin Qodirovich

Bukhara branch of the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, the Republic of Uzbekistan

ABSTRACT. The Strategy of Action for Development of the Republic of Uzbekistan for 2017-2021 highlighted that "Continuous development of agricultural production, strengthening of food security of the country, further improvement of irrigated lands, reduction of cotton and cereals, optimization of sown areas.

KEY WORDS. Soil cover, evolutionary laws, information technology, soil fertility assessment, soil quality, "soil quality" program. "soil quality".

I.INTODUCTION

Decree of the President of the Republic of Uzbekistan dated January 22, 2018 №PF-5308 "On the State Program on Implementation of the Strategy of Action on Five Priorities for the Development of the Republic of Uzbekistan in 2017-2021" Resolution "On Measures for Further Improvement of the Activities of the State Committee on Land Resources, Geodesy, Cartography and State Cadaster of the Republic of Uzbekistan" dated May 31, 2017, №PP-3024 The resolution of the Cabinet of Ministers of the Republic of Uzbekistan from March 29, 2019 of № 259 "About the forecasted volumes of the rational assignment of crops and production of the crop for the year 2019" and the effective use of available land and water resources, December 20, Decree of the President of the Republic of Uzbekistan "On the rational placement of crops for the harvest and projected volumes of production" and other regulatory and legal documents related to the activities of the direction [1].

II.THE PURPOSE OF THE STUDY

Improvement of the evaluation of irrigated soil productivity using information technologies based on the laws, features, formation, development and evolution of irrigated soil cover in the republic.

III.RESEARCH OBJECTIVES

- Reduction of time and labor costs, as well as the direct human factor in the evaluation of irrigated soils;
- improvement of soil fertility assessment methods;
- formation of a database on soil properties;
- improvement of soil fertility assessment using information technologies;
- determination of efficiency of application of information technologies in soil science;
- Development of recommendations for the conservation and improvement of soil fertility through the use of soil information analysis software in soil surveys.

The object of the study: The Republic is irrigated soils with different climatic conditions.

Methods of research. The researches were carried out according to the standard methods of soil science, which used geographic, genetic, historical-comparative, lithological-geomorphological, chemical-analytical and profile methods. Mathematical and statistical analysis of the data was calculated based on the method of dispersion statistics (Б.А. Доспехов) and also using the software "Soil quality" in the Java 8.0 programming language.

IV.RESULTS OF THE STUDY

The study provides a set of time criteria for grouping and rewarding of soils in the "State land cadaster and land monitoring, land management project - sample collection of time limits" information is provided.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 3 , March 2020

According to 10.6.3 part of the collection, shows the norms of time for grouping and soil quality assessment (bonitification) of soils and their description are as follows:

Content of the work: The list of regional soils and types of agricultural lands located in them will be defined, systematized listing of the names of soils according to the classification of existing soils.

Summarize the data of the regional districts based on the types and types of soils, taking into consideration the integration of different soil types into the evaluation groups.

Determination of bonuses scores for agricultural crops or the environmental groups evaluated using the method of analysis of correlation regression data on soil characteristics and productivity, based on the characteristics of soil agro-production[2].

Executors: Leading Engineer - 1

Soil Scientist I, Type II - 1

Soil scientist, technician I, category II – 1

Table 1

Unit of time measurement (a person per months), for per province.

№	Number of Assessed Farms	Time norms
1	80	12,30

Taking into account the urgency of the topic, the following was studied on the time and money allocated to the Soil Bonitization Program in the Vobkent district of Bukhara region in 2011 by the department of Bukhararegionlandproject ("Бухвилерлойиха").

The irrigated agricultural land area of Vobkent district is 20220 hectares, the number of farms in the district is 21, the category of complexity is 2, and the prepared maps are 1: 10,000. The leading soil scientist contributes 10%, soil science specialists of the 1st and 2nd categories, 40%, soil technologists and technicians 1 and 2 categories. Taking into account the fact that the leading soil scientist requires 10% of the amount and 12.3 people per month, it is allocated 1,044,205 sums. Soils 1 and 2 categories account for 40% and 12.3 man / month, which is 3 701 977 sums for this item. Soil science and technicians of the 1st and 2nd categories pay 3,667,583 sums for a 50% contribution and spend 12.3 people / month for work, and a total of 12.3 people per month for the district, which is 8,433,766 sums.

The estimates of these invoices are attached as in Table 2 below.

Table 2

№	Type of work	Area, ha	Expenditure	
			Time (a person per months)	Capital (mln.UZS)
1	soil quality assessment of Vabkent district	20220	12,3	8,41

Comparison of the Soil Quality program and the traditional method (using paper, pen, pencil, calculator) was carried out on the basis of soil quality assessment maps of Vobkent district farms of Bukhara region (2011) prepared by the “Buwilerilerproject” department of the “Uzdaverloyiha” Institute.

Timing was carried out with the participation of 12 specialists. At the same time, soil bonuses were used in the traditional way, using soil prepared for farms of Vobkent district of Bukhara region. Work on the determination of soil-level bonitas was carried out on the basis of the “Methodical Instructions for Bonitization of Irrigated Soil in the Republic of Uzbekistan” (RH-31-030-06), approved by the State Committee “Ergeodezkadastr” in 2005. According to it, each land allocation points class $B_a = K_1 * K_2 * \dots * K_n$ [3], as well as the average farm bonus class.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 3 , March 2020

$B_a = \frac{B_1 * M_1 + B_2 * M_2 + \cdots + B_n * M_n}{M_1 + M_2 + \cdots + M_n}$ was calculated by the formula.

In the first study, 12 experts determined the time needed to calculate soil score bonuses using the coefficients of salinity, humus content and P_2O (mobile phosphorus) levels, which are the same for all soil variations in a single area. For this purpose, H. Kamolov's farm, which has 1234.0 hectares of irrigated agricultural land, located in 1 soil zone, has 3 geomorphological structures, 2 soil types and 12 land areas. The data presented are summarized in Table 4, and on the basis of these indicators, the farm's land allocation score and the average score of bonuses are calculated[4].

V.EXPERIMENTAL RESULTS

Soil quality indices booking of farm soils. Table 3.

Soil Distribution No.	Name of soil	Soil quality index according to the main scale	Soil quality coefficients			Area (he).	Final soil quality index	Bonits hectare
			1	2	3			
1	Irrigated meadow soils	80	0,9	0,75	0,9	86,0	49	4179,6
2	Irrigated meadow soils	80	0,9	0,75	0,95	198,4	51	10177,9
3	Irrigated meadow soils	80	0,7	0,75	0,9	86,0	38	3250,8
4	Irrigated meadow soils	90	0,9	0,75	0,95	213,0	58	12292,8
5	Irrigated meadow soils	90	0,9	0,75	0,95	192,0	58	11080,8
6	Irrigated meadow soils	90	0,7	0,75	0,9	77,0	43	3274,4
7	Irrigated meadow soils	100	0,7	0,75	0,9	65,0	47	3071,3
8	Irrigated meadow soils	100	0,5	0,75	0,9	66,0	34	2227,5
9	Irrigated meadow soils	100	0,5	0,75	0,9	51,0	34	1721,3
10	Irrigated meadow soils	90	0,7	0,75	0,9	35,0	43	1488,4
11	Irrigated meadow soils	90	0,5	0,75	0,9	64,6	30	1962,2
12	Irrigated desert-meadow soils	100	0,5	0,75	0,9	100,0	34	3375,0
	Total:					1234,0	47	

As can be seen from the table, the coefficients on the basic scale and bonitization rates vary across all soil subsections. Based on the results of the first research, it was found that one expert spends 56.3 minutes on calculating the soil fertility of 12 farms and an average of 47.3 minutes, or 103.6 minutes. This is 21.1 days or 168.8 hours per month, 103.6 / 60 min per mass. = 1.73 hours or 0.22 per person / month. Taking into account the fact that there are 21 farms in the Vabkent district, it is estimated that 4.6 people per month (0.22x21.1) are required to carry out soil assessment[5].

And in "Soil quality", it is fundamentally different from the aforementioned method, and the advantage is that the process is performed concurrently. In particular, the process of calculating soil bonuses and soil properties by simultaneous and concurrent processes, regardless of how much of the soil separation, soil type, type, humus content and layer thickness, salinity, washing, rock hardness and other soil characteristics. in time. For this purpose it is enough to make the use of farm soils necessary. From the experiments with the program "Soil quality", an average of 5.7 minutes was spent on designing and preparing the use of one massive soil, and 119.7 minutes for 21 arrays in the district. 1 month is 21.1 days or 168.8 hours according to time standards and 5.7 min / 60 min for 1 mass. = 0.095 hours or (0.095 * 21.1 / 168.8) per unit of 0.012 person / month. There are 21 farms in the district and it is estimated that 1.99 hours (21 * 0.095) units are required to carry out soil-clearing works, or 0.25 per month (0.012x21.1).

The following table shows the economic efficiency of the use and implementation of Soil quality.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 3 , March 2020

Table 6

№	Type of research	Time expenditure (a person per month)			Capital expenditure (mln. UZS)		
		The usual way	In "Soil quality" program	Difference	The usual way	In "Soil quality" program	Difference
1	Soil quality assessment	12,3	0,01	12,29	8,41	0,02	8,39

Table 4

Comparison table used to calculate 1st massive soil score

Type of research	Time spent on preparatory work, min	Expenditure of time, min						**Minutes to recalculate, min.**	Total time, min
		by soil type and	n of humus layer	coefficient by mobility	coefficient Calculation of soil	**separation points.**	**deviation score hectares.**		
The usual way	12,0	5,4	5,7	5,8	4,7	12,0	5,8	4,8	56,3
Average in "Soil quality" program	5,7	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,7
Difference +;-	+6,3	+5,4	+5,7	+5,8	+4,7	+12	+5,8	+4,8	+50,6

This factor makes it difficult to calculate soil quality index points in a simple way and causes a certain amount of time to be spent. All the 12 experts involved in the timing work performed the calculations correctly, but it was found that the time they spent doing this was different.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 7, Issue 3 , March 2020

Table 5

Time spent on calculating the area of 1 mass soil characteristics.

Type of research	Time spent on preparatory work, min	Expenditure of time, min									Total time, min
		Determination of baseline by soil type and mechanical composition	Determination of humus layer thickness	Determination of coefficient by mobility of phosphorus	By the degree of potassium supply	By degree of availability of humus	By the degree of drywall	By intensity	Depreciation rate	In terms of hardness	
The usual way	6,0	5,6	5,0	5,0	4,9	5,0	4,0	3,9	3,9	4,0	47,3
Average in "Soil quality" program	0	0	0	0	0	0	0	0	0	0	0
Difference +;-	+6,0	+5,6	+5,0	+5,0	+4,9	+5,0	+4,0	+3,9	+3,9	+4,0	+47,3

When analyzing these charts, the Soil Quality software has revealed a large amount of time and manpower and savings during soil valuation, data reliability, reliability, multiple access, protection and other benefits.

VI.CONCLUSION AND FUTURE WORK

The scientific significance of the results of the research is due to the comprehensive approach to the use of information technology in determining the current state of irrigated soil, the development of the basic principles of the use of information technology in soil science, the wide use of information technologies and its effectiveness. There is also an opportunity to provide scientifically sound conclusions on the conservation and improvement of soil fertility using a database of soil fertility assessment using information technology.

1. Comprehensive analysis of irrigated soil fertility assessments using information technology, and a system was developed that allows for quick and easy use of results;
2. Database structure and database reflecting soil fertility conditions have been developed;
3. Reducing coefficients for soil fertility limiting properties on the basis of correlation dependencies are included in the Soil Quality program, and a database on soil properties has been developed using this program;
4. Evaluation of the productivity of irrigated soils proves that economic efficiency can be achieved by saving a lot of time and manpower;

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 7, Issue 3 , March 2020

5. On the basis of information technologies' evaluation of irrigated soils, bonitet points have been calculated for each land allocation, contour, farm, mass, district and regional level.

REFERENCES

[1] Decree of the President of the Republic of Uzbekistan dated February 7, 2017 N UP-4947 "On the Strategy of Action for the Further Development of the Republic of Uzbekistan".
[2] "Standard Land Collection of Land Cadastre and Land Monitoring, Land-surveying and Design Works" Tashkent 2005, p.198.
[3] “Guidelines for Bonit irrigated soils in the Republic of Uzbekistan” (RH-31-030-06) Tashkent 2005 15b
[4] The scientific basis of soil valuation. Textbook. National Encyclopedia of Uzbekistan. RELIGION T: 2012 56 b.
[5] E.Karimov, F.Hudberberdiev, Sh.Bafoqulov, K.Juraev Software "E-TS_BAHO-3" - An innovative approach to determining the quality of irrigated soils, Journal of Agroilm, Issue 1 (57), 2019, p.