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Suitability Evaluation of Characteristic Economic Crops Planting in Agricultural Development Based on GIS

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Abstract: Suitability evaluation of characteristic cash crops has become an important direction of agricultural regionalization research in recent years. Climate conditions, terrain conditions and soil conditions are important factors that determine the distribution and quality of famous and excellent agricultural products. The purpose of planting suitability evaluation is to make rational use of natural resources on the basis of fully evaluating the land potential, and then optimize the production layout. GIS technology is a new and high technology which is being widely used and has strong spatial analysis capability. Combining with the planting suitability evaluation model, it can give full play to the mapping performance and spatial analysis capability. Therefore, the purpose of this paper is to explore the development suitability evaluation based on GIS on the basis of studying the theory of cash crop planting, analyze the planting suitability evaluation system based on multiple linear regression algorithm, and explore the advantages and disadvantages of using this technology. This article will use the research method of specific analysis of specific problems to make data comparison and draw a conclusion. Through theoretical innovation and exploration, we can find a suitable model to promote the rapid development of cash crops. The research results show that the key to distinguishing economic crops with special features according to local conditions is to enhance the position of the main management body. After investigation and analysis, it is ensured that the appropriate management mode and method can account for 36% of the optimized planting path.Therefore, combined with the characteristics of the current era, the use of geographic integrated information system, fully absorb the transformation and actively innovate and improve the level of agricultural cultivation. Analysis of different application difficulties and exploration of development prospects, provide real-time digital planting production information for growers, thus developing land potential, realizing high crop yield and innovation and integration guided by these theories, provide valuable experience for wide application of geographic information system technology, and realize sustainable development of regional economic structure and ecological environment.

1. Introduction

Production practice and research results have proved that there are obvious differences in the impact of different promotion modes on agricultural production. The production of characteristic cash crops is similar to that of grain crops, and has both commonness and individuality. Qualitative, quantitative and positioning evaluation on whether specific crops are suitable for growth in specific regions can not only make full use of natural resources, but also optimize the overall layout of crop planting on the basis of the existing. GIS-based thermal cropping suitability evaluation system can simultaneously play the operational analysis ability of the evaluation model and the map representation and spatial analysis functions of GIS. The evaluation results provide decision support for subsequent planting planning and layout.

China is a large agricultural country. Since the founding of the people's Republic of China, China's agriculture has made great achievements. With only 7% of the world's arable land, it supports 21% of the world's population. However, the contradiction between human and land is sharp, and the per capita cultivated land area is far below the world average level, and with the acceleration of urbanization process in China, it is decreasing [1-2]. China's cultivated land area has dropped below the red line of 1.8 billion mu, and the contradiction between population, cultivated land and grain is increasingly prominent. The growth and development of different characteristic economic crops are closely related to climate, topography, soil and other natural environment conditions. There are obvious differences in the output and quality of characteristic economic crops under different natural environment conditions. Therefore, how to study the land layout of regional characteristic economic crops according to the natural conditions of each region, and how to develop characteristic economic crops according to local conditions to realize regional land resources Reasonable utilization of resources is of great significance [3]. Crop land suitability evaluation refers to the selection of natural and social economic factors of land as evaluation factors and the analysis of suitability and limitation of each component of land to crop growth by using scientific methods under the current productivity management level and agricultural utilization mode, so as to classify and grade the regional crop land. It is to optimize the layout of regional characteristic economic crops and carry out agriculture Basis of industrial structure adjustment. With the rapid development of social economy, urbanization and industrialization, the contradiction between human and land in Hangzhou will become increasingly acute. Therefore, it is necessary to evaluate the suitability of land use for special economic crops according to the requirements of special economic crop cultivation on natural environment conditions and the natural attributes and location characteristics of regional land resources. Land suitability evaluation involves many evaluation factors such as natural, social, economic and utilization management of land, which has the characteristics of large amount of data and indivisible attribute data and spatial data. Using traditional land suitability evaluation method, its calculation and processing efficiency is low and its accuracy is poor [4-5]. Using GIS technology to evaluate land suitability can not only combine the spatial data of evaluation unit with evaluation index data, but also analyze and process these data, so as to improve the efficiency and accuracy of land suitability evaluation.

As different evaluation factors have different influence on land quality and land use, only by making accurate judgment on the importance of each evaluation factor can the accuracy of the evaluation result be guaranteed [6]. Generally speaking, experts and scholars at home and abroad think that at present, there are two methods to determine the weight of land suitability evaluation factors: expert experience method and mathematical quantitative method. In the aspect of suitability evaluation method research, the weighted index sum method is the most commonly used method to

determine the land suitability level. This method fully considers the importance of each influencing factor and quantifies the influence degree of each participating factor. It has the advantages of clear thinking and strong logic. However, due to the different experience and the method of determining the weight, the evaluation result has a certain degree The subjective arbitrariness of [7-8]. In recent years, foreign scholars have used principal component analysis, fuzzy evaluation and neural network model to evaluate land suitability, in order to improve the accuracy of evaluation results. At present, many researches in our country are based on the theory of variable fuzzy sets, and the evaluation model of variable fuzzy sets is constructed to evaluate the land suitability. The results show that this method has good applicability in land suitability evaluation [9-10]. In addition, the fuzzy neural network model is introduced into the study of land suitability evaluation, and the evaluation effect is better. It can be seen from the research status of land suitability evaluation at home and abroad that although land suitability evaluation has made great progress in recent years, there are still some problems to be solved. First of all, in the current land suitability evaluation, most of the factors are the suitability factors within the natural environment system, such as climate, soil, terrain, lack of external soil environment, water environment, air environment quality evaluation factors and economic and social factors, which makes the evaluation results difficult to guide the overall development of the region, so the land suitability evaluation index system needs to be further improved[11-12]. Secondly, different evaluation methods have their own advantages and disadvantages, as well as different application fields, such as how to select the distance method and the cut matrix correctly in clustering model. The fuzzy membership function needs to give the demarcation point and the fixed value of the index accurately, so that the evaluation results can be consistent with the facts. Multivariate linear regression is easy to obtain samples, less subjective impact, and better accuracy, but the calculation workload is large and the stability is poor. Principal component analysis simplifies variables and has good accuracy, but it is difficult to obtain samples and has poor stability. Therefore, it is better to compare different evaluation methods in land suitability evaluation to get more objective evaluation results.

Starting from the meaning and characteristics of geographic information system technology and cash crop planting, this paper explores the development prospect of agricultural development informatization, so as to improve the scientific control of agricultural production, so as to better solve the problems encountered in the actual process, and expounds the research process and technical difficulties of information transmission and intelligent monitoring, mainly analyzes the positioning technology based on computer The difficulties encountered in the application of the technology in the integrated information system and the methods to solve the problems are to find out the rational use method and the balance base point in line with the natural growth law, and combine the two organically. On the basis of combing the relevant theories of agricultural planting and the logical relationship of adaptability evaluation model, the paper also discusses the possible improvement results of the use effect of geographic information system, so as to provide valuable technical experience for the scientific planting of economic crops in the future. And it also gives an objective outlook on the future development direction. At the same time, in order to better play the role of big data and information intelligence, reflect the goal of promoting the development of specialized and refined agriculture, it is also necessary to vigorously improve the comprehensive quality of planting personnel and strengthen the specialization and accuracy of information dissemination. At the same time, it is necessary to guarantee the improvement of evaluation technology. In view of the differences in the sequence of technological research, it is necessary to analyze the comparative advantages to find out the similarities and differences between Chinese and western research directions, learn advanced experience, put forward improved methods and paths,

and combine with new development methods, hoping to provide theoretical basis for the new model of modern agricultural development.

2. Method

2.1. Core Concepts

(1) Geographic Information System

Geographic information system is a special and very important spatial information system. It is a technical system that collects, stores, manages, calculates, analyzes, displays and describes the data of geographical distribution in the whole or part of the earth's surface, including the atmosphere space, under the support of computer hardware and software systems. A simple latitude and longitude coordinate can only be recognized and understood by users after it is placed in a specific geographic information and represented by a certain place, mark and orientation. After users get location information through related technologies, they also need to understand the geographical environment, query and analyze environmental information, so as to provide information support and services for user activities. As a kind of special information, geographic information also comes from geographic data. Geographic data is a symbolic representation of the relationship between various geographical features and phenomena, which refers to the sum of numbers, words, images, etc. that represent the quantity, quality, distribution characteristics and laws of elements in geographical environment. Geographic data mainly includes three parts: spatial location data, attribute feature data and time-domain feature data [13-14]. In today's society, people are very dependent on computers and the information processed by computers. In the computer age, the information system is partly or completely supported by the computer system. Therefore, computer hardware, software, data and users are the four elements of the information system. Among them, the computer hardware includes all kinds of computer processing and terminal equipment. The software is a computer program system that supports the collection, storage, processing, reproduction and answering of data information. The data is the object of system analysis and processing, which constitutes the application foundation of the system, and the user is the object of information system. With the popularization of GIS in decision-making, scholars have begun to consider the social impact of GIS. It is believed that the production, distribution, utilization and expression of geographic information are largely related to the social environment. Other related topics include copyright, privacy and censorship discussions. The more optimistic social application of GIS is to use it as a tool of public participation.

(2) Cash crop

Economic crops are also called "industrial raw material crops" and "technical crops". Generally, it refers to the crops that provide raw materials for industry, especially for light industry. There are many kinds of economic crops in China, including fiber crops, oil crops, sugar crops, three crops, medicinal crops, dye crops, ornamental crops, fruits and other economic crops. Cash crops usually have the characteristics of strong regionality, high economic value, high technical requirements, high commodity rate, and strict requirements on natural conditions, so they are suitable for centralized specialized production. Some of the world's major economic crops, such as cotton, sugar beet, sugarcane, hemp and tropical and subtropical economic crops, are highly concentrated and specialized [15]. Since the early 1980s, under the policy of "never relax grain production and actively develop diversified management", China has gradually expanded the area of economic crops, adjusted crop layout and built commodity bases for various economic crops according to the principle of "adjusting measures to local conditions and properly concentrating", and promoted the

overall development of various economic crops. With the continuous progress and rapid development of science and technology, more and more new technologies are scientifically and reasonably applied to agriculture. The dry land has its own unique characteristics, so in the specific analysis of high-efficiency economic crops in the dry land, we can scientifically and reasonably apply the mulching cultivation technology, which can not only improve the overall yield of high-efficiency economic crops in the dry land, but also effectively guarantee the quality of crops.

2.2. Research Methods

The system runs on PC, uses ArcView GIS 3.2 as GIS platform and Microsoft Visual Basic 6.0 Chinese enterprise edition as system development tool. The core of suitability evaluation system is database. Data is divided into spatial data and attribute data. The spatial data is used to describe the spatial geographical objects. The 1:250000 digital topographic map of the project area is adopted and stored in the coverage format, which is divided into 13 layers. The attribute data is organized in the format of relational database dBASE Ⅳ and stored in the form of. DBF table. It mainly includes the evaluation factor data used in the evaluation. The terrain data includes elevation, slope, aspect, etc. the temperature data includes the annual average temperature, ≥ and so on 10 ℃ accumulated temperature, extreme minimum temperature, etc., while water data include annual rainfall, annual average relative humidity, dryness, soil data include organic matter content, vegetation type, soil type, etc., and finally other factors are also considered, including wind speed and frost period. Sunshine time, annual and daily range, etc. Let random variable y and M independent variables x0, x1, X2 , X_{M-1}there is a linear relationship:

$$Y = a_0 x_0 + a_a x_1 + \cdots + a_{m-1} x_{m-1} + a_m \tag{1}$$

Administrative township (town) is the basic evaluation unit, and each township (town) is a record of the attribute table. Y is the suitability score of the evaluation unit, a number between 0 and 1. 1 indicates complete suitability, while 0 indicates complete non suitability. The suitability and conclusion of the evaluation unit are obtained. Input the evaluation factors of the object to be evaluated into the model, and calculate the suitability y of the object. According to the given evaluation system, the corresponding suitability conclusion is obtained.

$$\gamma(h) = c_o + \frac{ch}{a} \qquad o < h < a \tag{2}$$

$$\gamma(h) = c_o + c \qquad h > a \tag{3}$$

In this study, independent data set validation method is used to test the accuracy of spatial interpolation. The specific steps are as follows: firstly, the sample data set is divided into training sample set and verification sample set by using the method of random sampling. The training sample set is used to study the ordinary Kriging interpolation, and the predicted value and the measured value of each point in the sample set are compared and verified. In the process of using geostatistics to comprehensively consider all factors, it is required that the nutrient content data obey or basically obey the normal distribution, otherwise it is easy to cause the proportional effect of variation function. Among them, suitability evaluation model as an independent module embedded in the whole evaluation system, and the system has a common user interface. By using the link function of ArcView, the association with attribute data and spatial data is realized through keywords. The model can read the evaluation unit data from the GIS database for calculation, and

the calculation results are stored in the GIS database, and expressed by thematic map.

2.3. Theoretical Basis

(1) Diffusion principle of agricultural innovation

Innovation diffusion theory holds that innovation diffusion is a kind of social process, in which new voice information, new ideas, practices or things are spread subjectively. The significance of innovation gradually appears through the process of social construction. The research of aiowa hybrid maize shows that mass communication is very important in providing new information, while interpersonal communication is more powerful in changing personal attitude and behavior. Innovation diffusion can be divided into four stages: awareness, persuasion, decision and determination. The mode of scientific research project in this paper is actually the application of innovation diffusion theory. The research and breeding of improved varieties, purification and rejuvenation in the mode are to know, determine and decide. Active technology demonstration replaces passive persuasion and achieves the diffusion of technology and achievements. The evaluation factors cannot be all-round. When evaluating, it is necessary to focus on the evaluation object, grasp the main limiting factors in the evaluation area, involve the limitation of each limiting factor on the research object, select the leading factors with rich connotation, and set the indicators as simple as possible to avoid complexity. There are many factors that affect the planting of characteristic cash crops, and there are overlapping information between the indicators. Therefore, when selecting indicators, we should select those indicators with better representativeness, stronger relative independence and better comparability at the same level through scientific elimination, so as to increase the accuracy and scientificity of the evaluation index system.

(2) Principles of farmers' behavior change

The extension of agricultural science and technology is to communicate with farmers, to spread their ideas and technology, and to intervene their behaviors, so as to guide farmers to participate in the activities of changing agricultural technology voluntarily. There are many ways to change people's behavior, which can be achieved through technical consultation, changing social economic structure, providing production conditions, providing extension services, influencing farmers' quality, commodity or service exchange, etc. That is to say, it can be achieved by changing the three strategies of giving priority to farmers' personal quality, changing the environment and changing people and environment at the same time. The government as the main body of the technology demonstration promotion model. In fact, the mode of industrial sustainable promotion with professional cooperatives as the main body is to achieve the change of farmers' quality and concept through technical service and system management. The former is active while the latter is passive. In the field of agriculture, through complex intellectual labor in scientific and technological activities, people get scientific and technological achievements with obvious economic value, social benefit, or academic value, such as product technology, methods, etc. The promotion of new varieties is the recognition and promotion of a series of technical achievements with varieties as the core.

(3) Theory of institutional change

Institutional change refers to the process of institutional substitution and transformation, which is the process that the old system is replaced by a more efficient system. Institutional change is the process of breaking the original institutional pattern with the change of time, which is the rearrangement of the system under a certain institutional environment. Around the 1970s, the study to explain economic growth was greatly promoted by the study of long-term economic history, and

finally institutional factors were included in the explanation of economic growth. In the sense of economics, institution in the theory of institutional change is a series of rules, procedures, moral and ethical codes of conduct, which is called "institutional arrangement" by North. Institutional arrangement refers to an arrangement that dominates the possible cooperation and competition between economic units. The purpose of institutional arrangement is to provide a mechanism for the cooperation of its members to obtain some additional income that is impossible to obtain outside the structure, or to influence the change of law or property rights, so as to change the way in which individuals or groups can compete legally. The technology demonstration mode with the government as the main body and the industrial sustainable mode with the professional cooperative as the main body are all agricultural activities with the standardized operation regulations and standardized management regulations as the system. The production of these regulations is supported by a large number of research results suitable for scientific researchers. Firstly, the spatial variation distribution of interpolation variables is considered, so that the local estimation value of a point or a surface can be improved to determine the range of distance that affects the value of a point to be interpolated, and then the value of the point to be interpolated can be estimated by the sample value in this range. The theoretical basis of this method is the theory of regional change.

3. Experiment

3.1. Data Source

In order to determine the factors to be considered in the process of regionalization, firstly, the relationship between the meteorological factors and their influence factors is studied. For this reason, firstly, the data of the whole experiment are collected from the annual average temperature, the frequency of the occurrence of the annual extreme minimum temperature ＜ - 13 ℃, and the correlation between the climatic factors such as altitude, longitude and latitude are analyzed. Influenced by surface vegetation, slope direction, slope and other factors, the correlation coefficient between annual precipitation and annual sunshine hours and altitude, longitude and latitude does not reach the correlation level of temperature. Through the correlation coefficient, it is found that: there is a positive linear relationship between precipitation and altitude, and there is a negative linear relationship between precipitation and longitude and latitude; there is a positive linear relationship between annual sunshine hours and altitude, longitude and latitude Department. The clear days from late April to mid may have a significant linear correlation with latitude and a negative linear relationship with altitude. In this method, the regression equation between dependent variable and independent variable should be established firstly, then the dependent variable should be predicted by regression equation, and the residual of dependent variable should be calculated. After local interpolation of residual, the interpolation data of residual should be added to the regression value of dependent variable to get a new fitting value. The interconnection test results of each part through correlation coefficient are shown in the table.

Table 1. Simple correlation coefficient between gas elements and influence factors

Correlation Coefficient	Altitude	Latitude	Longitude
T	-0.9097	-0.4036	0.0365
R	0.3272	-0.6438	-0.8514
S	0.1741	0.2145	0.3254
$\sum T_{\geq 10℃}$	-0.9227	-0.3683	0.0589
F	0.9684	0.2014	-0.2072
U_{4-10}	0.4741	0.5324	0.0363
QD	-0.2803	0.5487	0.7856

3.2. Experimental Method

Firstly, the method of soil sample collection and measurement is adopted. The soil nutrient data in this study are all from government supported projects. Combined with the actual situation of the region, the density of sampling points is determined according to the principles of comprehensiveness, balance and objectivity. Using the second Soil Census data, the soil map, administrative division map and land use status map are digitized and superposed to form the evaluation unit map. Then take the evaluation unit map as the working base map, and determine the number and location of points according to the number, area, planting system, crop species, yield level and other factors. According to soil type, crop type, yield level and other factors, the number of distribution points of different evaluation units is calculated respectively, and adjusted appropriately according to the needs.

Secondly, the specific value processing method was used. The existence of specific value is easy to cause the proportion effect of variogram, which leads to the distortion of experimental semivariogram, so that the base value and nugget value of semivariogram are raised, the inherent spatial structure characteristics and distribution pattern of variables are also covered, and the estimation accuracy is reduced. 8 The sampling data of each agricultural county has a large amount of data. The specific value processing method is to first analyze the maximum, minimum, standard deviation, average and the upper and lower 5% data of each nutrient content data, and then replace and delete the specific value with the combination of 3 σ criterion, domain value method and Tyson polygon method to ensure the data comprehensiveness.

Thirdly, classical statistical methods are used. The distribution and total variation of soil nutrients in cultivated land were studied by using classical statistical parameters such as range, mean, standard deviation and coefficient of variation. The analysis of variation characteristics is mainly measured by coefficient of variation C.V. Through the use of semi variogram, also known as semi variogram and semi variogram moment, it refers to half of the variance of the sum and difference of regionalized variables at points, which is the unique function of geostatistical analysis. Combined with spatial autocorrelation analysis, the correlation characteristics of nutrient content of each factor can be characterized. Combined with fractal dimension, the spatial structure variation and random variation characteristics of nutrient content can be better revealed.

3.3. Purpose of the Experiment

With the further study of crop suitability evaluation, it will be restricted by the scale effect of

evaluation results in the development of suitability evaluation to the direction of synthesis, accuracy and dynamic. Because of the great heterogeneity and variability of the factors affecting the growth of crops in time and space, the complexity of the research on the evaluation scale of crop suitability is increased. The internal relationship between the spatial distribution of crop planting and geographical environment factors at different scales. Whether the research results of small-scale experiment can be extended to the research of large-scale and specific methods of evaluation scale conversion has become an urgent problem to be solved in the future crop suitability evaluation work, which needs to strengthen the multi-disciplinary exchange, and introduce new theories, methods and computer simulation, remote sensing, GIS and other technologies into the research of evaluation scale deduction. After the reform and opening up, with the implementation of the rural joint production contract responsibility system in China, the original three-level agricultural technology promotion service system in the rural areas of China has been hit hard by "broken network, broken line, scattered people". According to the attribute values of spatial sampling points, it is a fitting mathematical surface, which is used to reflect the overall trend change of the attribute data in space. Generally, it can be divided into zero order which means there is no trend effect, constant which means the research variables increase or decrease in a certain direction, first order which means the research variables change in a straight line in a certain direction, and second order which means the research variables change in a polynomial in a certain direction Therefore, governments at all levels have taken various means and measures to solve the problem of rural science and technology promotion. However, due to the limitation of system and mechanism and the simplification of various service means, it has not been able to establish the problem of relying on market mechanism to build a long-term comprehensive agricultural service system. At present, the original agricultural science and technology extension system still exists. In order to adapt to the market economy, there are many forms of co-existence, such as special technology extension led by enterprises and industrial technology extension dominated by cooperatives.

4. Discussion

4.1. Evaluation and Analysis on Suitability of Land Model

The evaluation index system must be supported by the corresponding scientific theory, established on a certain scientific basis, and its connotation and extension must be clear, which can correctly reflect the basic quantitative characteristics and quantitative relations of factors, and has certain representativeness. Therefore, in the evaluation, we should pay attention to the evaluation object, be good at grasping the restrictive factors of the evaluation area, select the leading factors with rich connotation, and set the indicators as simple as possible to avoid complexity. As shown in Figure 1, the changes of economic indicators in the promotion process of improved varieties of different subjects are different, and different types of business subjects should be selected. According to the general measurement standards, many planting enterprises will take the lead in adopting good varieties of planting, relying on strong economic strength and large planting area to carry out planting, but if there is no accurate experiment and analysis, through increasing the yield of saponin, it will often do half the work. The cooperatives and some farmers with professional planting technology pay more attention to the adaptive planting of land, which makes the research purity have better reference.

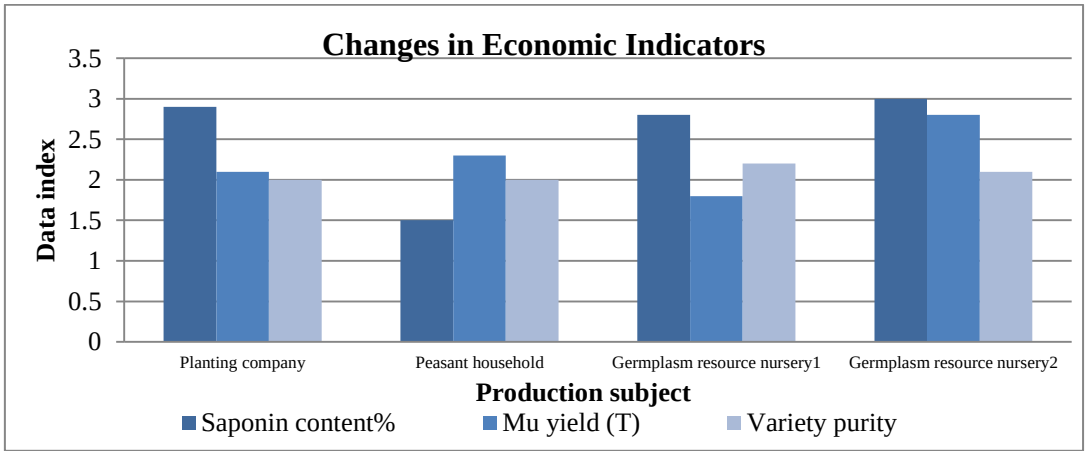

Figure 1. Changes of economic indicators in the process of promotion of improved varieties

Because the selected evaluation factors are the concept of single factor, the data types and data dimensions of each evaluation factor are different, and the contribution degree to land suitability is different, so the data of each evaluation factor is transformed in some ways. Due to the different expected objectives of each promotion subject, the effect of promotion is quite different. The research promotion mode focuses on quality, the technology demonstration promotion mode focuses on area and demonstration, the market-oriented promotion mode focuses on efficiency, and the industry sustainable promotion mode focuses on quality. As shown in Figure 2, by analyzing the influence modes of different influence factors through the model, countermeasures can be formulated according to local conditions. The results of evaluation and analysis are sorted according to the comprehensive index, and the trend analysis chart is obtained. According to the actual situation and expert experience, combined with the comprehensive index of land suitability, it can be seen that the nutrient obtained in the soil is very sufficient, so the soil fertility should be protected to the greatest extent, the relationship between the atmosphere and the soil should be treated according to the specific distinction, the growth habits of crops should be combined with the GIS integration information Rest, match the right proportion of nutrients.

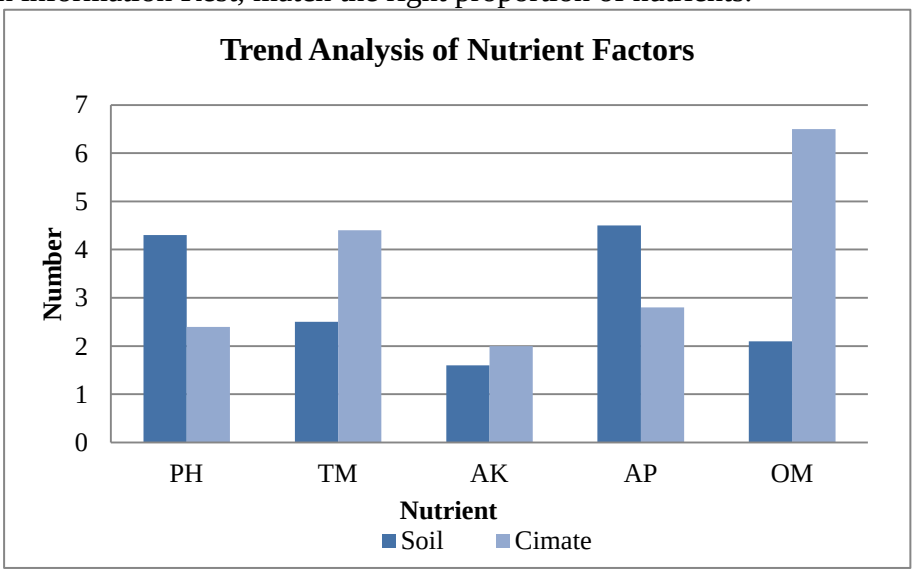

Figure 2. Trend analysis of nutrient factors

4.2. Optimization of Economic Crop Planting Path

(1) Build a multi-element cooperative promotion system. In the initial stage of special economic crops planting, the promotion mode should be supported by technicians, and the research promotion mode with scientific research units as the main body should be the main promotion mode. The maintenance of variety quality of characteristic cash crops is of great significance for the later large-scale promotion, and the work of variety maintenance in this stage will continue after the end of this stage. In the later stage of the planting and promotion of special economic crops, we can even further combine other promotion modes that can rapidly expand the area, market-oriented promotion mode with enterprises as the main body and random promotion mode with specialized households as the main body.

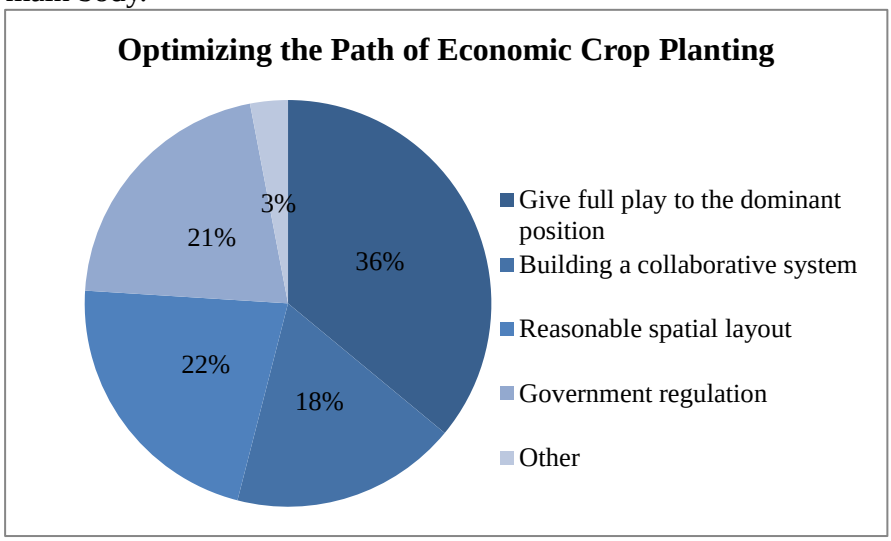

Figure 3. Optimization of economic crop planting path

(2) Give full play to the role of new business entities. In order to guarantee the scale and quality of the planting and extension of special economic crops, we should develop a diversified extension mode with the main mode of industrial sustainable extension with professional cooperatives as the main body. Establish close economic ties with enterprises, and then actively seek government support. As shown in Figure 3, the optimization of economic crop cultivation can not only rely on the farmers, but also rely on government support and scientific planning. Fundamentally speaking, to give full play to the new business subject is to say goodbye to the traditional agricultural mode, ensure the development of planting scale and characteristics, and constantly optimize the path to find ways to maintain the sustainable and healthy development of the industry.

(3) The spatial distribution pattern is reasonable. According to statistics, the cultivated land area between > 22g/kg and 20-22g/kg is 11644.73 hm2 and 15687.73hm2 respectively, accounting for 4.01% and 5.40% of the total cultivated land area, both of which belong to medium to upper organic matter content level. However, only 13106.48hm2 and 1335.29hm2 of cultivated land are in the range of 12-14g/kg and < 12g/kg, accounting for 4.51% and 0.46% of the total cultivated land respectively, which are extremely low levels. As shown in fig. 4, with the increase of oxygen and nitrogen content, the organic matter will also increase, but the opposite effect will develop beyond the critical value. According to the content of soil organic matter, determine the crops suitable for growth. In the process of field research and experiment, there are few cultivated lands with high

organic matter content and extremely low organic matter content. However, reasonable layout space can be selected according to the adjustment.

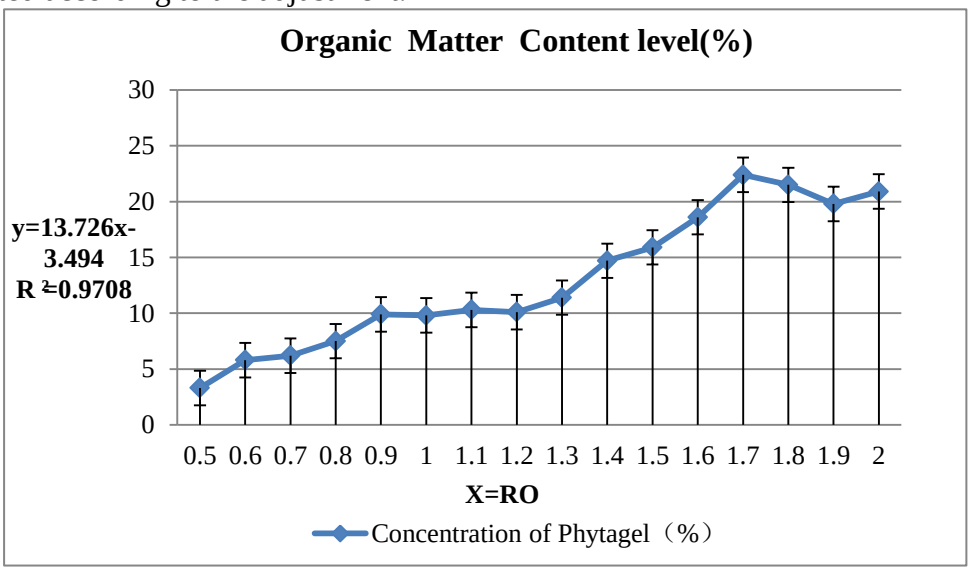

Figure 4. Organic matter content level

5. Conclusion

Based on the local characteristics, this study firstly selects climate conditions, topography and soil properties as three factors to evaluate the suitability of several economic crops, then simulates the spatial distribution of climate factors in Hangzhou by using the mixed interpolation methods such as regression inverse distance weight method, regression spline method and regression trend surface analysis method, and makes a comparative analysis of spatial accuracy Using fuzzy membership function and AHP to evaluate the quantity and quality of suitable land for special economic crops.

The suitability evaluation system of hot planting based on GIS can give full play to the operation and analysis ability of evaluation model, the map representation and spatial analysis function of GIS. The evaluation results provide decision support for the following planting planning and layout. The evaluation results show that the suitability distribution of hot planting in the project area is significantly affected by the elevation and temperature. Many suitable planting areas for hot cropping are much larger than the existing planting areas, indicating that there is still great potential for hot cropping production, and the key lies in adjusting measures to local conditions and reasonable layout. Considering from the technical level, the scientificity of the evaluation results and the feasibility of the methods mainly depend on the integrity and accuracy of the basic data, the selection of the evaluation factors, the determination of the evaluation unit, the selection of the samples, and the selection of the GIS spatial analysis methods. These need to be determined according to the actual situation and specific needs of the evaluation.

The evaluation results can not only provide consultation and suggestions for planting planning and adjustment of agricultural structure layout, but also provide effective help for government departments at all levels to guide agricultural production, give full play to regional natural and regional advantages, promote the layout of characteristic agricultural products, and improve the overall efficiency of land resources development. At present, the study of crop suitability evaluation mainly focuses on the construction and improvement of the suitability evaluation model, but the

suitability of the indicators used in the model construction is often ignored. Therefore, the evaluation index system of crop suitability needs to be further improved in the future.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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