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Exploring the Comprehensive Utilization Mode of Straw from the Perspective of "Company & Farmer"

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Abstract

Aiming at the current situation of straw burning and comprehensive utilization, this paper takes the current situation of comprehensive utilization of straw in Anhui Province as an example, and understands the current situation of rural straw utilization and the straw recycling and treatment technology of "Lemjia Biotechnology Co., Ltd." through field visits and face-to-face interviews. On this basis, the structural equation model is used to analyze the farmers' satisfaction with straw utilization. Finally, this paper proposes the process of green comprehensive treatment of straw comprehensive utilization and the process of Large-scale rapid stacking of straw.

Keywords

Comprehensive Utilization of Straw; Process Flow of Green Comprehensive Treatment; Process Flow of Large-scale Rapid Stacking Rot of Straw; Structural Equation; Ridge Regression.

1. Research Background and Significance

1.1. Research Background

The report of the 19th National Congress put forward the development strategy of "accelerating the reform of the ecological civilization system and building a beautiful China". As we all know, what affects and restricts each other between man and nature is an inseparable community of life. It is our responsibility to respect nature, conform to nature, and protect nature. To build a modern society in which man and nature coexist in harmony, in addition to material wealth and spiritual wealth, a beautiful ecological environment is equally important as high-quality ecological services. Green water and green mountains are golden mountains and silver mountains, and protecting the ecological environment is to protect productive forces. If we want to solve environmental problems, we must change the mode of development, economic structure and consumption patterns, and pay close attention to the key areas of environmental protection, key issues and weak links in environmental governance. The improper treatment of straw is precisely the problem that needs to be solved urgently in the current environmental problems. Farmers burn straw directly in the field after harvesting crops, resulting in a large number of pollutants such as sulfur dioxide and nitrogen dioxide, causing smoke to lock the road and inducing a series of environmental problems. In the case of the government's repeated orders to strictly prohibit the burning of straw, farmers have introduced straw into the Hou river, resulting in extremely serious pollution of the river. General Secretary Xi Jinping emphatically pointed out that the construction of ecological civilization is in the contemporary era and the benefits are in the thousands. We must firmly establish the concept of socialist ecological civilization, promote the formation of a new pattern of harmonious development and modernization between man and nature, and make efforts to protect the ecological environment. Therefore, under the guidance of the rural revitalization strategy, it is of far-reaching practical significance and research value to rationally improve the mode of

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agricultural development, develop and apply agricultural green ecological technologies, and promote the comprehensive utilization of crop straw.

1.2. Research Significance

1.2.1. Theoretical Significance

The burning of straw has created serious atmospheric and global environmental problems. So far, researchers at home and abroad have focused their research on the estimation of straw burning pollutant emissions, the determination of straw burning pollutant emission factors, and the analysis of the spatio-temporal distribution characteristics of pollutant emissions. In view of the current situation of straw burning and comprehensive utilization, taking the current situation of comprehensive utilization of straw in Anhui Province as an example, this paper obtains certain data through field visits, face-to-face interviews, etc., and then conducts empirical analysis, on the basis of predecessors, the types of straw, the status quo of utilization and the effectiveness and countermeasures of pollutant emissions in Anhui Province are discussed, and reasonable suggestions are put forward for the comprehensive utilization mode of straw, which is of reference significance for clarifying the direction of straw development and utilization and realizing the virtuous cycle of comprehensive utilization of crop straw.

1.2.2. Practical Significance

In recent years, although China has achieved remarkable results in the comprehensive utilization of straw resources, there are still problems such as low straw utilization rate, unreasonable layout of the processing industry, and short processing industry chain. Improving the comprehensive utilization rate of straw has the following important significance: effectively alleviating the employment pressure of farmers, improving the effect of precise poverty alleviation, and promoting farmers' income increase; using the straw green recycling industry as the carrier to promote agricultural industrialization and promote and promote the development of regional economy; alleviating the tension of rural feed, fertilizer, fuel and industrial raw materials; protecting the rural ecological environment, promoting the sustainable and coordinated development of agriculture, and establishing a new agricultural industrialization model; contributing to the increase of local township finances; and greatly accelerating the pace of township industrialization. It has injected strong vitality into the prosperity and development of the rural economy.

1.3. Research Methodology

1.3.1. Literature Analysis Method

By collecting, sorting, reading and summarizing relevant literature, it can provide certain references and ideas for our research. After reading and analyzing the relevant literature, we can easily draw relevant methods, suggestions and theories on the comprehensive utilization of straw, etc. Based on the views in these literatures, we can put forward new views and new insights on the comprehensive utilization of straw, and verify and revise these preset views in practice in order to put forward effective and high-quality theories.

1.3.2. Questionnaire Method

The questionnaire survey method is a method widely used in social surveys at home and abroad, and the questionnaire design requires standardization and quantifiability. When the research team studied the mode of comprehensive utilization of straw and proposed a new way for the comprehensive utilization of straw in China, it needed certain data and data as support, so it was necessary to conduct a questionnaire survey. At the same time, when the questionnaire survey work is carried out, the research team will continuously optimize the questionnaire structure according to the relevant theories of the questionnaire survey in order to obtain more objective and accurate data.

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1.3.3. Structural Equation Model

Structural equation models, also known as SEM (Structure Equation Modeling) models, are essentially statistical methods that use generalized linear equations to express causality between latent and explicit variables. It is an organic combination of two analytical methods of path analysis and factor analysis, which mainly uses path analysis to study the relationship and structure of two variables and explore the optimal path problem between variables, as well as the dimensionality reduction technology and variable measurement problem of factor analysis method.

1.3.4. Ridge Regression

Ridge regression is a biased estimation regression method dedicated to collinear data analysis, which is essentially an improved least squares estimation method, which is more realistic and reliable to obtain regression coefficients at the expense of losing part of the information and reducing accuracy by abandoning the unbiasedness of the least squares method, and the fitting of the pathological data is stronger than the least squares method.

2. Investigation and Analysis of the Current Situation of Comprehensive Utilization of Rural Straw

2.1. Investigate the Basic Situation of Straw in the Area

2.1.1. Analysis of Straw Species

Through the analysis of straw species in the surveyed areas, we found that wheat, corn and rice straw accounted for more, accounting for 21.15%, 19.97% and 21.31% respectively. Bengbu three major crops for rice, corn and wheat, rice originated in tropical Asia, planted in the Yangtze River Basin is widespread, is a direct cash crop, the world's 1/3 of the staple food is rice, it can be seen that the large number of rice planting is bound to bring about the huge output of rice straw, make full use of rice straw has great practical significance; corn as another major crop, known for its sweet taste, is also a large number of crops planted in the area under investigation, and the use of corn straw is the residue left after the maturity of corn, the volume is larger, The sugar extracted from the straw can be used as the raw material for "caramel", which shows that making full use of corn straw and its deep processing has rich market prospects; "bread, steamed buns." The main raw material for the manufacture of biscuits and other foods is wheat", in addition, fermented beer, alcohol is also favored by people, its straw can be deeply fermented to make alcohol, and the process flow is simple, so the full use of wheat straw will bring great economic benefits to farmers.

2.1.2. Degree of Understanding of Straw Burning Policies

The promulgation of the policy is still a certain distance from the implementation, we conducted a survey on the degree of publicity of the policy, the vast majority of the respondents know that there is a policy of banning straw burning, but do not know the specific content of the policy, accounting for 66.7% of all the respondents, but also 26.43% of the farmers understand the specific content of the straw burning policy, which shows that the straw burning policy is in place, but it is not implemented to the real place, just let the farmers know the concept of "no burning", without specifically understanding the harm of straw burning. Therefore, the government's propaganda department needs to further guide farmers in the treatment of straw.

2.1.3. Analysis of Straw Burning Situation and Treatment Causes

Although the state has strictly banned the burning of straw, in this survey, about 96.07% of the respondents showed that there is no phenomenon of burning straw at present, but there are still 1.43% of the respondents who say that they occasionally see the phenomenon of burning

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straw, but they are all small areas, mainly under the strict monitoring system, they dare not easily violate the law. For a very small number of farmers who burn straw, we have done a detailed investigation of the main reasons for burning straw, hoping to analyze the main motivation for straw burning, so as to prescribe the right medicine in order to completely solve the problem of straw burning.

In order to further analyze whether the farmers burned straw on the spot and the reasons they gave for the burning of straw, we combined the straw burning situation selected by the farmers with the reasons for burning, and obtained the results of the analysis: Among the respondents, most of the farmers believe that there is no phenomenon of burning straw at present, accounting for 96.07% of all the investigators, which shows that most farmers abide by the law and no longer burn straw on the spot to avoid polluting the environment.

For a small number of farmers who burn straw, "do not understand other uses of straw" is the largest reason (up to 28%), farmers have insufficient understanding of the harm of straw burning, a considerable number of people think that straw burning is "no big deal", limited by the level of knowledge of comprehensive utilization of straw, that straw can not bring other utilities, so choose to burn on the spot. Secondly, more than a quarter of the farmers think that "burning in situ, easy to deal with", with the improvement of farmers' living standards, most of the farmers' homes use liquefied gas or even natural gas, few farmers use straw as fuel, 26.09% of farmers think that there is no treatment place" on the basis of realizing that straw can be recycled and reused, but suffering from no company or enterprise to engage in recycling work, it can be seen that there is still a lot of room for growth in enterprise publicity and promotion. There are also 17.97% of farmers think that the cost of recycling straw is too high, sometimes they spend a lot of time and energy to give straw to the relevant enterprises, but they can get very little remuneration, thinking that this is a "not cost-effective deal", they even rely on years of experience to believe that the burned straw is potassium-rich grass and wood ash fertilizer, suitable for neutral and acidic soil, which is good for planting crops in the coming year, which also promotes their burning of straw on the spot.

3. Investigation and Analysis of the Current Situation of the Comprehensive Utilization of Straw in the Company

3.1. Analysis of Existing Problems in Straw Utilization

Straw Biotechnology Treatment Company is in the front line of straw biotechnology research and development and treatment, and has the most direct impression of straw treatment. In response to the current problems of the company's staff on the biological treatment and utilization of straw, 45% of the employees told us that there are fewer successful business models, and their own companies often have to pay a lot of money to "innovate" a new business model, and sometimes it is bound to cause more than they lose. Secondly, the staff believes that the straw recycling technology is backward is also a big reason, the number of interviewees who agree with this view accounts for about 31%, technology is the foundation of enterprise competition, the business model that is separated from the physical technology is meaningless and valuable, therefore, the company has invested a lot of effort in "technology", such as Anhui Lemjia Biotechnology Co., Ltd. and universities to reach an agreement, carry out technical exchanges and cooperation, and continuously promote the development of enterprises, bigger and stronger.

For straw treatment enterprises, straw storage is also a big problem, straw rot needs to occupy a large place, but also takes a long time, if a large piece of site is specially divided for straw rot may bring huge site rental costs, reduce production and processing efficiency, 14% of employees believe that straw storage is a big problem, but also an urgent problem to be solved. Another 10% of employees believe that the government's policy support for such energy-saving

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and environmentally friendly enterprises is not enough, and that policy support for such enterprises should be strengthened to reduce the operating pressure in the initial stage of enterprises, and at the same time contribute to our vigorous development of organic fertilizers.

3.2. Analysis of the Reasons Why Straw Utilization cannot be Popularized

For the utilization of straw resources, there are still many problems in China, and there is a big gap between them and European and American countries. In order to find the root cause of the problem and prescribe the right medicine, we surveyed the company's employees. As shown in Figure 17, of which 72.24% of the staff believe that "the scale of comprehensive utilization of straw, the low degree of industrialization" is the biggest problem, even if a few straw treatment enterprises propose straw biotechnology treatment, but small-scale treatment can not solve the problem, let alone open up the market, can not really establish straw biotechnology made of fertilizer sales brand. The second is the problem of "economic subsidies", the government has no economic subsidies for straw processing enterprises and farmers, so that the initial stage of straw treatment will suffer great difficulties and is easy to stifle in the cradle of development.

For biotechnology enterprises that integrate technology research and development and production development, capital investment and withdrawal is a problem that must be considered. Among the respondents, 26% of the employees raised the question of "large capital investment and slow cost recovery", most of whom were company management, and they had a more macro analysis of the development of the enterprise. On the other hand, the government's publicity and promotion, 12.50% of the respondents said that if the propaganda is carried out solely by relying on enterprises, it is easy for the people to think that this immature idea is only a development similar to pyramid schemes, and cannot get substantial results, so the government's auxiliary propaganda is very necessary. From a pragmatic point of view, the current biological treatment contact of straw is still in its infancy, which cannot bring realistic help to daily production and life, which is also a problem raised by 13.50% of enterprise employees.

3.3. Analysis of the Causes of Farmers Burning Straw from the Perspective of Enterprises

39% of staff believe that farmers burn straw because it is convenient and simple, and it can also increase the fertility of the soil to reduce their production costs. The second is to support the view that "no unit transportation or too high cost", accounting for 23.86% of all respondents, although there are already straw processing enterprises, but due to the large weight of straw, a transport may cost a lot but bring small benefits, resulting in farmers are more inclined to burn in situ. In addition to burning straw on the spot, farmers can also choose to take home for treatment, but now that every home is electrified, straw resources are no longer the key to ensuring normal production and life, and the mechanical cost of their own home treatment is too large, which is easy to cause unnecessary waste, and 9.94% of the staff recognize this view.

Straw treatment companies and farmers face a major problem is the "pile rot site", the large volume of straw leads to the need for a large pile of rot space and consumes a lot of time, if you find the pile rot, the labor cost of the caretaker is an unavoidable problem, therefore, 23.07% of the staff raised this problem, and hope to find an effective way out as soon as possible.

4. An Investigation on the Relationship between Straw Treatment and Straw Production

4.1. Yield of Straw of Various Types

In this paper, five types of straw with typical representatives in China are selected: rice straw, corn straw, wheat straw, cotton straw and rapeseed straw, and the dependent variable selected

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is the annual investment in environmental governance. Since at the time of collecting data, China currently does not have statistics on the amount of straw produced by various types, this paper believes that about 50% of the agricultural input factors are converted into crop straw calculations according to relevant research, and the data from 2007 to 2017 have been obtained, see Table 1.

Table 1. Statistics related to straw production per year

year	invest	rice	corn	wheat	cotton	oilseeds
2007	3387.3	18638.1	15512.3	10952.5	759.7	2787
2008	4937.03	19261.2	17212	11293.2	723.2	3036.8
2009	5258.38	19619.7	17325.9	11583.4	623.6	3139.4
2010	7612.19	19722.6	19075.2	11614.1	577	3156.8
2011	7114.03	20288.3	21131.6	11862.5	651.9	3212.5
2012	8253.46	20653.2	22955.9	12254	660.8	3285.6
2013	9037.2	20628.6	24845.3	12371	628.2	3287.4
2014	9575.5	20960.9	24976.4	12832.1	629.9	3371.9
2015	8806.3	21214.2	26499.2	13263.9	590.7	3390.5
2016	9219.8	21109.4	26361.3	13327.1	534.3	3400
2017	9538.95	21267.6	25907.1	13433.4	565.3	3475.2

Source: National Statistical Office

4.2. Establishment of Ridge Regression Models

According to the relevant data, we can use the ridge regression equation to establish a model of the relationship between straw generation and its governance capital investment. The use of ridge regression models requires calculating ridge regression coefficients based on mathematical formulas such as ridge regression cost function. The details are as follows:

Ridge regression cost function:

$$J(\theta)=1/2m\ [\sum (i=1)^m[\ (h_\theta\ (x^((i)\ )\ )-y^((i)\ )\ )^2+\lambda\sum (j=1)^n\theta_j^2]\ ]$$

Linear regression standard equation method:

$$w=[(X^T\ X)]^(-1)\ X^T\ y$$

Ridge regression solution:

$$w=(X^T\ X+\lambda I)^(-1)\ X^T\ y,\ \lambda \text{ is the ridge coefficient}$$

Among them, the choice of ridge coefficient λ should meet the following two conditions:

(1) The ridge estimation of each regression coefficient is basically stable

(2) The sum of squares of the residuals is minimal

4.3. Relationship between Straw Treatment and Straw Production

In order to ensure the accuracy of the solution results, the cross-validation method is adopted, which not only avoids the determination of the small amount of data but also makes the results

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more representative. First of all, the relationship between the ridge coefficient and the Loss value is made by using Python software, and the minimum loss value is the corresponding ridge coefficient value, that is, the best ridge regression coefficient in this model, as shown in Figure 1.

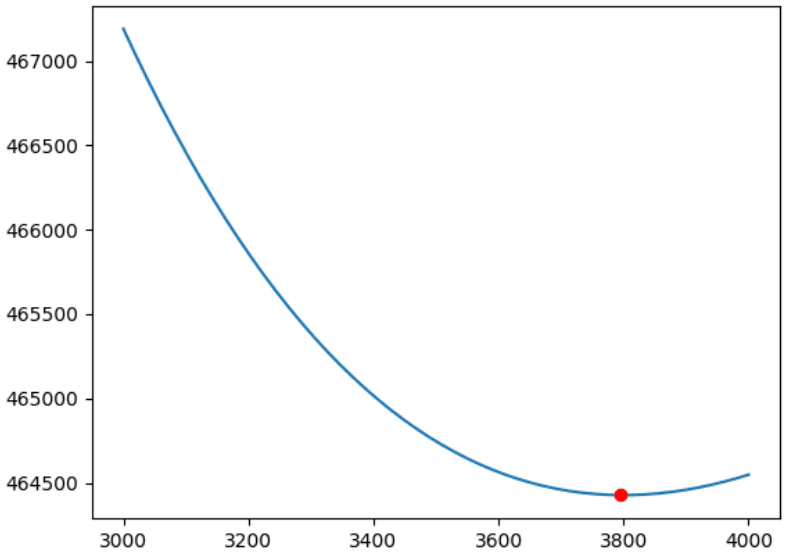

Figure 1. Relationship between ridge coefficients and Loss values

From Figure 1, it can be concluded that the optimal ridge coefficient in this paper is 3795, and the λ= 3795 is substituted for the ridge regression solution equation, and each regression ridge coefficient can be calculated, and the final ridge regression equation is:

$$invest=0.56rice+corn-2.94wheat-7.06cotton+8.2oilseeds$$

From the final results of ridge regression, it can be seen that the environmental pollution generated by rapeseed straw is the most serious, and the investment in governance in this regard is also the largest. Therefore, the burning of rapeseed straw should be treated in time in China, and the control of the burning of rapeseed straw is imminent.

5. Process Design of Comprehensive Treatment of Straw

5.1. The Process Flow of Green Comprehensive Treatment

Each enterprise can first screen out the strains of Trichoderma agribus, Bacillus subtilis, Bacillus licheniformis, etc. with independent intellectual property rights, and develop a highly efficient biodegradable bacteriodegrade agent for straw, shortening the biodegradation time of straw, about 10-15 days;

Established a Large-scale biodegradation process based on straw in the field, and for the first time built a drip irrigation and aeration pipe network system inside the pile, effectively solving the problems of humidity, temperature regulation and internal oxygen supply in the pile biodegradation of straw, and forming industrialization;

Adopt the industrialization operation mode of "government + enterprise + farmer", establish a biodegradation field in the concentrated place of straw, centralize the purchase of straw, and carry out centralized biodegradation. The biodegradable organic fertilizer can be directly

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returned to the field, reducing the cost of straw fertilizer utilization, and innovating the effective way of straw resource utilization;

Using agricultural organic solid waste resources, the biomass carbon high temperature anaerobic cracking technology, phosphorus hydrophosphorus bioorganic fertilizer technology, organic and inorganic application technology are comprehensively integrated, and a regional wheat water-saving and fertilizer-saving technology system is formulated;

Instead of continuous flow of nitrogen in the form of batch nitrogen filling, a biochar preparation method that can significantly save nitrogen is provided, and the loss of "carbon" element can be reduced, the carbon sequestration effect of biochar can be improved, and the yield of biochar can be increased;

5.2. Straw Large-scale Rapid Heap Rot Process

The most important way to carry out comprehensive utilization of crop straw is the fertilizer of straw. However, as far as the current situation of agricultural development in China is concerned, the amount of crop straw is huge, and at the same time, there is a problem of high transportation costs. Therefore, it is difficult to solve the straw problem in its entirety by relying on enterprises alone. Therefore, the traditional organic fertilizer production and operation mode can no longer meet the needs of the current straw treatment, and a new industrial operation mode must be found.

On the basis of comprehensively considering the rapid tillage rot of straw and the comprehensive utilization of returning to the field, the industrialization operation mode of "straw field heap rot and fertilizer" of "guided by the government, supported by enterprises, and mainly based on farmers' cooperatives" is adopted.

5.3. Technical Application and Effectiveness of Process Design

The technical achievements are mature and the effect is obvious, and it has already had an industrialized production stage. By using various technologies related to the project, product development, building a demonstration base for product production and processing, and promoting technology and products, it has been possible to quickly realize the resources and industrialization of straw.

Edible mushroom base: Edible mushrooms are rich in nutrients, high protein content, delicious and delicious. The use of straw to produce edible mushrooms can consume a lot of straw resources, and the cultivation process of different edible mushroom varieties is similar, but the management details are slightly different. Therefore, according to market research, timely change the cultivated varieties, enrich people's vegetable baskets, avoid market risks, and increase income.

Bio-organic fertilizer: After biodegradation and fertilizer, calcium, magnesium, phosphorus and nitrogen-fixing functional microbial agents and other raw materials are added to produce, which can effectively improve soil salinization, acidification, microbial flora imbalance and other problems caused by excessive inorganic fertilizer application, increase soil aeration, water retention and fertilizer retention capacity, and improve soil microbial activity. In addition, many experiments have proved that organic fertilizers can reduce the content of heavy metal ion exchange states and reduce their bioavailability. At present, the team has developed a series of products such as field bio-organic fertilizer and facility agricultural bio-organic fertilizer, which can effectively repair soil acidity, salinization and continuous cropping obstacles. The heavy metal content meets the national standard, the organic carbon content is not less than 45%, the number of effective live bacteria is not less than 0.2 billion / g, and the product quality meets the national standard.

Substrate: Straw, mushroom residue and other waste raw materials are biodegradable and fertilizerized, and nutrients such as calcium and magnesium are added and perlite, vermiculite,

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etc. are used to make a matrix, which can be used for flower cultivation, nutritional bowl seedlings and organic vegetable cultivation and production.

Soil remediants: Biochar is a solid product produced by pyrolysis of bio-organic materials at low temperatures in an anaerobic or anaerobic environment. It can be used as high-quality energy, soil amendment, reducing agent, sustained release fertilizer carrier and carbon dioxide storage, widely used in carbon sequestration and emission reduction, water purification, heavy metal adsorption and soil improvement. Based on biochar, chemical modification is carried out. It has a strong adsorption effect on heavy metal ions. Under the action of biochar multifunctional microbial agent, the soil with heavy heavy metal pollution was removed in situ and repaired. The heavy metal content meets the national standard, the organic carbon content is not less than 45%, and the heavy metal Cd, Zn, Pb, Cu, etc. have a good remediation effect, and the heavy metal content of the soil after restoration meets the national standard for soil quality in farmland.

5.4. Benefit Analysis of Comprehensive Straw Treatment Process

The application of Lemga Biotechnology Co., Ltd. for straw has achieved industrial chain operation, with high efficiency, through visits and analysis of the data we collected, we believe that it mainly has outstanding benefits in economic, ecological and social aspects.

5.4.1. Economic Benefits

Through the visit to Lemga Biotechnology Co., Ltd., we have a preliminary understanding of its benefits, but the company's production benefits are how big, we still lack relatively clear data, the following is the company's data on the composting processing of a ton of potato straw, the production of 1 ton of organic fertilizer material cost and benefit analysis, as shown in Table 2.

Table 2. Material costs of organic fertilizers

raw material	Percentage/%	Cost/Yuan
straw	60	120
feces	30	30
Toner	5	5
clay	5	10
ME bio-fungal agent	0.1	60
synthesis	--	225

If the market price of the straw organic fertilizer comprehensive processing machine is 35,000 yuan a piece, one hour can produce two tons of organic fertilizer, the market price of each ton is 600 yuan, deducting various costs of 400 yuan, (raw materials per ton of 225 yuan, labor costs of 15 yuan, machine depreciation of 65 yuan, other costs of 95 yuan), processing a ton of organic fertilizer can generate income of 200 yuan, work 30 days a year, work 8 hours a day, each machine generates 96,000 yuan per year.

5.4.2. Ecological Benefits

The ecological advantages of comprehensive straw treatment are mainly manifested in the positive effect on the ecological environment and the application of industrial buildings and businesses. By converting straw into biological fertilizer and soil remediant through related technologies, it has effectively realized the transformation of waste into treasure in agriculture, which is conducive to the development of green planting, and the comprehensive recovery of straw has eliminated the problem of straw being burned, which is conducive to protecting the

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atmosphere and reducing greenhouse gas emissions. In addition, the comprehensive utilization of straw, such as papermaking and as a protective material for building facades, can effectively replace the demand for trees and bamboo, protect surface vegetation, and reduce soil erosion.

5.4.3. Social Benefits

The social benefits of comprehensive recycling of straw is a closed loop around the "government + enterprise + farmer" as the core, the three parties in this benefit ring each have their own needs, for the government, the comprehensive recycling of straw is conducive to the better implementation of the "straw burning" policy in the jurisdiction, protecting the ecological environment of the jurisdiction, for related enterprises, it helps to promote the industrial chain communication of the enterprise and other enterprises in the market, better improve the industrial chain, for farmers, the straw that was originally discarded anywhere, completely realize the transformation of waste into treasure, It has become an important way to increase income and change the planting capacity of farmland.

6. Safeguard Measures for the Comprehensive Utilization of Straw

6.1. Government Level

6.1.1. Increase Administrative Impetus

The government has increased its attention to the comprehensive utilization of crop straw and increased policy support. Set up special funds for environmental protection, and formulate preferential support policies such as encouraging Large-scale planting and increasing the proportion of subsidies for straw utilization and recycling, to improve the comprehensive utilization of straw.

6.1.2. Strengthen Publicity and Guidance

Make full use of newspapers, television, the Internet and other news media to popularize to the masses the advantages of comprehensive utilization of straw to the greatest extent, comprehensively publicize the methods of comprehensive utilization of crop straw and relevant laws and regulations, subsidies for machines for the comprehensive utilization of straw, and subsidy policies for straw returning to the field, and increase the enthusiasm of farmers in carrying out the work of comprehensive utilization of straw; relevant agricultural departments should also play a guiding role, regularly carry out training activities, and invite relevant professionals to carry out new technologies and new tools for the comprehensive utilization of straw for farmers.

6.1.3. Actively Introduce New Technologies

Actively introduce new technologies for the transformation and utilization of straw, achieve rational utilization through power generation, gasification, and post-carbonization combustion, strengthen exchanges and cooperation with scientific research institutes such as the Academy of Agricultural Sciences according to the specific conditions of local straw resource recycling, and make use of the talent advantages of many researchers such as experts and professors of scientific research institutes to carry out advanced technologies such as the selection and introduction of agricultural products, supporting straw silage, etc., so that the comprehensive utilization of straw has entered a virtuous circle.

6.2. Enterprise Level

6.2.1. Introduce Outstanding Talents

At present, the technical level of comprehensive utilization of straw is still insufficient, so it is necessary to introduce talents to promote the technological development of enterprises. At the same time, the introduction of talents can improve the hard power of the enterprise itself, which is conducive to the future development of the enterprise.

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6.2.2. Establish a School-enterprise Research Base

At present, most agricultural colleges and universities have studied the technology of comprehensive utilization of straw, and universities have high-quality scientific research resources, but what they lack is often the practical link, so enterprises can build School-enterprise scientific research bases and bring the excellent achievements of the school to their own companies.

6.2.3. Establish Multiple Straw Recycling Sites

For the comprehensive utilization of straw enterprises, the number of raw materials required is also huge, and it is far from enough to rely on the number of straw in a certain place to support the company's production, but the transportation cost of straw is also very high. Therefore, enterprises can set up multiple recycling sites in multiple places and use field dumping technology to ensure an adequate supply of raw materials and reduce the transportation cost of raw materials.

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