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Research Status of Sorghum Straw Utilization

Abstract: With the development of agriculture, although the level of China’s grain production and production continues to increase, but the crop straw utilization is still in the lower case. This paper describes the present stage of utilization of crop stalks and straw at home and abroad for the treatment, as well as for domestic utilization of sorghum.

Keywords: Sorghum, stalks, Utilization status, Renewable energy

1 Introduction

Sorghum is one of the earliest cultivated cereal crops in China. It originated in Africa and has the characteristics of drought resistance, water logging tolerance, barrenness, salinity tolerance, disease resistance and insect pest. It is an annual herbaceous plant with a long history of cultivation in China. Can be planted in arid climate and barren soil. Because of its high photosynthetic efficiency, high biological yield and wide adaptability, it is widely used as feed and energy crops in China. For a long time, sorghum is one of the main food crops of the people in the north [1–2]. Sorghum can be classified into sorghum, sweet sorghum, and sudangrass according to its characteristics and uses. In China, grain sorghum is mainly used for food, wine and feed; sweet sorghum biological yield, sugar rich stem, not only can provide high-quality feed, but also as raw material production of industrial ethanol, “high-energy crops” Said it is a high quality feed crop, sugar crop and renewable energy crops [3–6]. Sudan grass is a kind of high-quality pasture, with high protein content, nutrient-rich, good palatability characteristics of livestock [7–9].

2 Overview

Straw is a general term for the stem and leaf part of mature crop. It usually refers to the remaining stem and leaf part of wheat, rice, maize, potato, rape, cotton, sugar-
cane and other crops. The straw quality traits include crude protein (CP), crude fat (EE), soluble sugar (WSC), acid detergent fiber (ADF), acid lignin (ADL), neutral detergent fiber [10]. Improve the feeding quality of stems, straw can be used as ruminant feed, can effectively alleviate the problem of feed shortages.

3 The Purpose and Significance of the Study

Crop stalks are the fourth largest energy source in the world after coal, oil and gas [11–13]. Due to the waste and shortage of energy resources in recent years, the use of waste materials such as crop stalks to produce energy has been extensively studied. Concern, not only increased the production of new energy sources, reducing production costs, but also reduce the process of dealing with straw pollution generated by environmental problems.

As a big country of agricultural production, China has abundant straw resources, the annual output of straw is about 900 million tons, rational use of straw is conducive to the rational development of agriculture, industry and rural economy. If the straw is directly burnt, not only release a lot of harmful gas pollution Environment, kill the soil microorganisms to change the soil structure, but also a direct result of waste of resources. At present, China's stalks for stalks stagnated in the way, livestock feed and building materials, for the innovative use of straw to be further developed.

4 Research Status at Home and Abroad

4.1 Overview of Utilization of Straw in Foreign Countries

According to the main crop harvest index and its annual agricultural production statistics, estimated by the Food and Agriculture Organization (FAO), the total output of straw in 2012 is 5.081 billion tons, of which the total output of straw is 940 million tons, The United States, India, Brazil and other countries 15 more than 500 million tons of straw in the country, the total output of 2.875 billion tons of straw, accounting for 56.58 % of the world's total. Straw production in the world's first straw production, accounting for 18.50 % ; Straw yield of less than 50 million t of other countries, the total output of 1.266 billion tons of straw, accounting for 24.92 % of the world [14].

Abroad, the main way for the use of straw is straw recycling, developed countries are focusing on fertilization structure, basically formed a direct return of straw and other systems for the application of straw more fully, basically avoid the straw waste and open burning The problem.
In the developed countries, through scientific and technological progress and innovative technologies, a variety of ways have been found for the comprehensive utilization of crop straws. In addition to the traditional methods of crushing straw into organic fertilizers, there are concentrated in emerging energy sources, such as straw feed, straw Power generation, and straw ethanol.

4.2 Overview of Domestic Straw Utilization

In China, crop straw is very rich, about 900 million t each year, of which straw, wheat straw, corn stalks accounted for more than 70 % of these three stalks. In the domestic straw, livestock is a very traditional straw, the use of high efficiency, straw through silage, ammoniation, micro-storage treatment and other methods to feed livestock to promote the development of animal husbandry while the straw Return to field, increased soil fertility, is conducive to the next season crop growth and development [15–17].

In southern China, people use rice straw and other crops for storage, can be used for weaving brooms, cushions, mattresses and other household goods, you can also feed livestock, poultry compost to the field, and even as a simple housing roof, However, due to the popularity of coal, electricity, natural gas and increasingly abundant daily necessities in China in recent decades, there has been a decrease in the demand for straw, and a large amount of straw has been reduced in quantity, and the production of straw has been reduced. Straw residue, and even some farmers in the field directly to the straw burning, on the one hand a large number of harmful gases released on the environment causing serious pollution, easily lead to fire, on the other hand a serious waste of resources.

5 Development and Discussion

In recent years, the main grain-producing areas in China there have been more serious phenomenon of open burning straw, this approach is not only a waste of natural resources, causing environmental pollution, but also seriously endanger human health and safety; the state has enacted relevant laws, the relevant departments Much work has been done to order the prohibition of open burning, although some success has been achieved, but such problems remain serious.

Crop straw is a valuable renewable energy, in addition to straw, power generation, building materials to do, effectively improve the content of nutrients in straw and feed quality, improve palatability, can effectively promote the development of animal husbandry, but also improve straw utilization, reduce waste.
The main quality of various sorghum for different purposes is mainly concentrated in sugar hammer degree, stalk energy and so on. The content of reducing sugar can reflect the product quality and economic value of sorghum to some extent, which is one of the important indexes to evaluate the quality of sorghum. The crude protein of sorghum mainly accumulates in grain and stalk, the current research on stem is relative the research on crude protein of stalk is in the primary stage. At present, most of the research on the crude protein of sorghum is focused on sorghum grain. With the transformation of sorghum use, people pay more and more attention to the production and utilization of sorghum. More and more attention has been paid to the nutrient composition of stem. Therefore, a large number of sorghum varieties with different genotypes were selected to determine the crude protein content in stems, and the comparative analysis showed that the heritability of crude protein content of stems was higher, which could provide better and more choices for breeding new sorghum.

China sorghum stalks yield more each year, but the utilization rate is low, a serious waste of resources, especially sweet sorghum after the production of industrial ethanol residue of sweet sorghum residue, which contains large amounts of nutrients, sweet sorghum is also a very important feed Crops are not only of high nutritional value but also of high biological yield, and their yields of silage are much higher than those of other crops such as corn [18]. Is the preferred crop for the production of silage in water-scarce areas [19–20].

Sorghum stalks are rich in nutrients, including crude protein, reducing sugar and other nutrients, can be used as ruminant roughage to be used to alleviate the shortage of ruminant feed problems. Green feed is rich in nutrients, ruminants like to feed, but because of its high water content is not easy to store. In order to be able to save the green for a long time the nutritional content of feed, you can take two methods to deal with green feed to achieve the purpose of storage. One is the green feed dehydrated hay made; the other is the addition of silage to green feed into the silage. This can adjust the supply of green feed seasonal problems. Silage after the green feed, not only to maintain a good green feed nutrients and water, and in silage fermentation, will produce large amounts of aromatic compounds, it has an aromatic smell and soft and juicy, improved palatability Sex, feeding effect than the green feed is more superior, is a long-term preservation of green feed a good way.

References

