

Application of modern biotechnology in food detection

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Abstract: along with the development of social economic transformation, the mass material consumption level unceasing enhancement, the kind of food choice increasingly diversified, standard is also very concerned about the quality of food safety. In the field of modern food production and processing, in order to extend the shelf life of food, present a beautiful image of food, adjust the taste of food import, related enterprises and personnel will use various types of additives. In order to reduce the production cost and improve the taste satisfaction of the audience, some food manufacturers use unreasonable additives, which threatens the life and health of consumers to a great extent. Based on the food detection work, this paper expounds the necessity and characteristics of the application of modern biotechnology, discusses the effective application of modern biotechnology in food detection, in order to improve the accuracy and effectiveness of food detection, and further keep the red line of food safety.

Key words: modern biotechnology; Food detection; application

Introduction

In the era of highly developed human material civilization, the production scale of modern food industry continues to expand, and the public pays more and more attention to “tongue safety”. It is urgent for relevant personnel to introduce more rapid, efficient and accurate food safety detection technology, do a good job in tracking and testing food safety, and reduce food safety risks. In the field of food production and processing, biotechnology was widely used hundreds of years ago, processing personnel use biotechnology to produce bread, yogurt, soy sauce and other food. Modern biotechnology is based on biotechnology and engineering technology products of The Times, including inorganic chemistry, immunology, biology, molecular science and other disciplines, relevant personnel can take this technology to analyze life development and activity rules, can also be applied to the field of food detection, enhance the food safety detection of science, rationality and speed, to provide the public with safe, high quality, assured food, Improve people’s satisfaction with food.

1. The necessity of the application of modern biotechnology in food testing

In the new normal of social and economic development, people’s material living standards continue to improve, the quantity and quality of food requirements continue to improve, in addition to a variety of vegetables, fruits, a variety of semi-finished food is favored by the public. However, in the process of vegetable and fruit production, in order to improve the yield and economic benefits of vegetables and fruits, some growers fail to properly grasp the amount of pesticides. Once the proportion of pesticides is unreasonable, a large amount of pesticides will be left in vegetables and fruits on the market, threatening the normal operation of people’s lives and even causing liver and kidney function problems. At the same time, in the field of food production and processing, some manufacturers pay too much attention to economic interests and do not use additives and preservatives in strict accordance with the standards, which improves the taste of food and extends the shelf life, but will damage the internal tissues of the human body imperceptibly. In this regard, in order to improve people’s quality of life, happiness index, it is necessary for relevant personnel to in-depth study of modern biotechnology, the use of advanced technical equipment and tools, improve the speed and quality of food detection, to ensure the accuracy and scientific detection data.

2. The application characteristics of modern biotechnology

In the food testing work, the application of modern biotechnology is strong, the staff can quickly detect the number, types and indicators of microorganisms in food, quickly complete the food testing work, to ensure food safety.

(1) High efficiency

In the era of rapid development of modern biotechnology, staff can according to the characteristics and requirements of detection, comprehensive use of a variety of detection technologies, complete the detection task within a limited time, quickly generate detection indicators, show the high efficiency of food detection work.

(2) Diversity

In the era of industrialization, industrial production has brought pollution to the atmosphere, soil and water, and a series of environmental factors have threatened the food safety belt. The traditional detection technology has been difficult to meet the current demand for food detection. And the modern biological detection technology has diversity, the staff can according to the detection needs, analysis of the characteristics of the diversification of technology, and reasonable selection of biological detection technology, can not only meet the needs of different food detection, but also enhance the accuracy of food detection.

(3) sensitivity

The sensitivity of food testing tools and technologies directly affects the accuracy and efficiency of food testing data. In the field of food detection, modern biotechnology is increasingly advanced, the staff can improve the sensitivity of food detection by introducing and applying advanced biotechnology.

3. The effective application of modern biotechnology in food detection

(1) Application of biosensor technology

In principle, the personnel can use the biosensor technology to automatically identify antibodies, antigens, proteins, enzymes and other organisms, and then through the signal amplifier and special converter conversion, the chemical and biological reactions are quantified into specific chemical and physical signals, successfully detect the composition of chemical substances. From the perspective of composition, sensors and transducers are two parts of the biosensor, the former membrane has the function of identifying highly selective molecules, the latter has the function of converting chemical substances and biological substances reaction performance (such as light, heat), automatic processing of converted electrical signals, displayed on the instrument screen. Based on the difference of signal transducers, biosensors include the following categories: piezoelectric, optical, electrochemical, thermal type, etc.; Based on the membrane reaction type and detected substance, biosensors mainly include metabolic sensor, catalytic sensor, affinity sensor; Based on the difference of substance identification, there are biosensors for immunity, DNA, tissue, microorganisms and enzymes, providing support for the staff to detect food in different fields.

(2) The application of electronic nose and tongue

With the gas sensor array, the electronic nose can collect different types of odors and convert them into physical signals that are associated with time nodes and suitable for calculation to effectively identify gas mixtures. Similar to human taste sensing systems, the electronic tongue is integrated with lipid-like membranes, which can use taste sensors to sense food smell information, which is translated into corresponding physical signals to sense the substances contained in the food. When carrying out food detection work, the personnel can use the electronic nose to compare the data of fresh products with the data provided by the electronic nose to judge whether meat, fruits and vegetables are fresh. The electronic tongue can also be used to analyze the quality of wine and oil, and test the level of meat enzymes and the content of fruit lactone.

(3) The application of enzyme-linked immunosorbent assay

Based on the principle of antigen specificity and antibody fusion, ELISA selects a marker -- enzyme, marks it on immunoglobulin or antigen, and achieves the detection purpose through enzyme reaction and immune reaction. This detection method has a wide range, quick and simple operation, and reliable accuracy. In the detection of fungi, bacteria, pesticides and other biotoxins in food, the staff can select samples, carry out a large number of detection work, obtain inactive and active biological components, strong applicability.

(4) The application of test strip method

At present, many types of test strips and kits have entered the detection market, such as insect-resistant Bt toxic protein, phosphine acetyl transferase and shikic acid hydroxy-acetyl transferase. All three have the function of detecting herbicide resistance, and have entered the market with the characteristics of easy to understand, easy to use and high accuracy.

(5) Application of DNA probe technology

Based on the base pairing method of DNA molecules, researchers have introduced an emerging DNA probe technology detection method, which can accurately judge various performance parameters of samples, improve the work level, and obtain more reliable and accurate detection data. In the work of food detection, Chinese inspectors mainly use the different and the same hybridization, but due to the limitation of technology, the two detection methods need to consume high costs. At the same time, this technology requires the use of radioactive isotopes, marking physical objects, but isotopes will affect human health, if there is strong light in the detection environment, this technology will be decomposed, leading to large data errors. So the DNA probe technology is still in its development stage, and technicians need to step up their research to find ways to circumvent these problems and better support food testing.

(6) Applying biochip technology

Firstly, based on the chip with probe molecules, the biological gene chip can efficiently interpret the sequence information of DNA samples. In principle, because the chip contains the deoxyribonucleotide sequence of different genes and special markers, the gene chip can detect the special signal generated by matching the deoxyribonucleotide base of the sample in a unique way. For the staff to detect specific genes in food to provide a basis. In the process of food detection, through the application of biological gene chip, the staff can comprehensively observe the situation of viruses and fungi in food, and timely find harmful bacteria and fungi. Compared with Petri dish based food testing, gene-chip technology is smarter, less susceptible to external factors and more accurate. Second, similar to the principle of gene chips, protein chips are suitable for protein testing and have various types of carriers and substances, such as biofilms and biological experimental slides. By using protein chip technology, inspectors can simultaneously detect multiple samples and obtain the data of antibodies, proteins, amino acids and antigens. The detection results of this technology are highly objective.

(7) Application of near infrared spectrum analysis technology

In principle, many foods have the ability to absorb spectrum, and the near-infrared spectrum can unify the frequency doubling absorption region at all levels and the frequency of the vibration of the molecular hydrogen-containing groups, obtain the near-infrared spectrum of samples, and provide the information of organic molecules containing hydrogen groups. In the optical fiber, the transmission of near infrared spectrum is strong, the personnel can not only apply it in the field detection link, but also can specially establish online detection quality control points. This technology has low environmental requirements, high analysis efficiency, fast speed and wide range, and the detection process will not produce substances that pollute the environment. However, the sensitivity of near infrared spectroscopy analysis technology has not reached a high level, the data is highly variable, and the relevant departments need to invest a lot of manpower

and financial resources, to establish a special model library. In the detection of milk quality, detection personnel can use online or offline way, detection of milk composition, adulteration, idealized index; For soy sauce detection, the personnel can obtain the total ammonia, total acid related data.

(8) Application of PCR technology

Compared with traditional detection methods, PCR technology is not only short in time and convenient, but also can detect pathogenic bacteria in food in an all-round way, making it more practical. In the field of aquatic products, some aquatic organisms or Marine organisms often carry some bacteria. By applying PCR technology, detection personnel can quickly detect these safety risks. In the traditional PCR process, the personnel need to use penetration method to extract DNA, and use PCR to obtain the amplification results to be detected, and carry out the detection. By applying the advanced real-time quantitative PCR technology, the detection personnel can rely on the fluorescence characteristics, complete the rapid detection work under closed conditions, easier operation, and suitable for different scenarios, the experimental detection results are also very reliable.

4. Conclusion

To sum up, strengthening the application of modern biological detection technology in the field of food detection affects the efficiency of food detection and the accuracy of detection data. At present, the traditional detection technology consumes a lot of time and economic costs, and the accuracy cannot be controlled, and it is difficult to adapt to the current social needs. And a variety of modern biological detection technologies are simple to operate, accurate measurement results, fast testing speed and broad application range, such as biosensor technology, various PCR technology, biochip technology and other high-tech biotechnology, inject new vitality to the field of food detection. Therefore, relevant departments and detection personnel should pay close attention to the development of advanced biotechnology, keep up with the development trend of new technology and new science, traditional food safety detection and modern biotechnology combined, in making up for the lack of traditional detection work at the same time, improve the efficiency of food detection work, better guarantee food quality and safety, so that consumers buy at ease, use at ease, eat at ease.

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