The research progress of detection techniques for pyrethroid pesticide residues

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Abstract

The application amount of pyrethrins is only less than organ phosphorus pesticide. Pyrethrinshave the side effects on human immune system, reproductive system and nervous system. This paper reviewed the research advances of pretreatment technique, chromatography-mass spectrometry detection techniques and rapid detection methods of pyrethrins residues. On the basis of this, the harm and management countermeasures of the insecticides of the pyrethrum were introduced. The purpose of this paper is to remind people to use the insecticide of the pyrethrum.

Keywords

Pyrethrins; Pretreatment; Quick detection; Environmental protection.

1. Introduction

Pyrethroid pesticides pesticides as a kind of efficient pesticides, broad-spectrum, low toxicity and biological degradation characteristics, widely used in the tea, vegetables, fruit crops such as pest control, become one of the world's most widely used pesticides [1, 2], but the side effects of using after also gradually revealed. In recent years, it has been found that pyrethrin pesticides have toxic side effects on the reproductive, immunological and neurological aspects of mammalian species [3-5]. People's long-term consumption of food containing the pesticide residues of the pyrids can cause chronic or chronic poisoning [6, 7].

The newly revised food safety law prohibits the use of highly toxic and toxic pesticides on crops such as vegetables, fruits and tea [8]. Therefore, it is of great practical significance to establish a simple, quick and safe detection method.

2. Pretreatment of pesticide residues[9]

For the detection and analysis of trace elements in the complex sample matrix of pesticide residues in food, the pretreatment of samples is a crucial step, which determines the accuracy and reproducibility of the analysis. China's current methods for testing the residual standard of the nonesterification are fluid. Such Liquid. iquid extraction(LLE), solid phase extraction(SPE), gelpermeation chromatography (GPC) , as sample preparation methods[10]. The traditional pretreatment methods of the traditional samples such as LLE and SPE are tedious and time-consuming, and the solvent consumption is large, and the extraction and purification effect are not stable. The GPC has developed into a mature pretreatment technology for agricultural residues because of its excellent performance, good regeneration performance and high degree of automation. However, the GPC also has a large solvent consumption and a low recovery rate of large molecular pesticides. In recent years, both domestic and international have been in the family of juesterification. The research on the pretreatment of residual test is very active, and a lot of new progress has been made

2.1 QuEChERS method

The method of QuEChERS is a agricultural research service in 2003, the development of a test sample preparation technology of agricultural products, its basic operation is the sample by

acetonitrile extraction and separation after crushing or homogenate, and MgSO4 salts for removeing water, add PSA, CI8 and GCB adsorbent in the purification, analysising supernatant fluid direct [11]. The essence of QuEChERS method is the derivation and further development of matrix solid phase dispersion technology and solid phase extraction technology. The recovery rate, high accuracy, wide applicable range, low cost, easy operation and quick security, and many other advantages, is ideal testing laboratory large-scale sample processing method, has higher application value.

2.2 Microextraction technique

The microextraction technology has been applied to the detection and research of the pyrethrum residue by more and more researchers because of its use of a very small amount of extract and easy to operate. Solid phase microextraction (SPME) is a pre-treatment technology that integrates extraction, concentration and desorption, because of its small volume, short time consuming, high sensitivity, good reproducibility, easy automation and the advantages of the online operation, since the first reported in 1990, and got rapid development and application of the technology. But its extraction head USES short life and high cost. In recent years, more microextraction techniques have been developed and used.

2.3 Pre-processing technology for graphene

Graphene from graphite strip have been the only one carbon atom thickness of 2 d carbon nano materials, the structure stability, specific surface area is large, rich of π electronics, thermal stability and chemical stability is good, is a very good prospect of application of adsorption separation medium [12]. In recent years, the research on the application of new graphene materials to pesticide residue testing is very active.

3. Detection technology of pesticide residue

Present in the actual use of high frequency pesticide residue detection methods are mainly concentrated in the chemical method, instrument analysis, enzyme inhibition method and immune analysis, etc., provided larger choice space for pesticide residue detection and convenience.

3.1 Chemical detection

The detection method is mainly based on the oxidation-reduction characteristics of organopho sphorus pesticides. Usually can be prompted by metal catalyst material in hydrolysis of organophosphorus pesticide, hydrolysate can react with detection used in the solution, prompting testing solution from purple to colorless, which can determine the presence of organic glass pesticide. This method is effective in improving the problem of enzyme instability and preservation. However, the detection method has its limitations, and its detection sensitivity is relatively low. If there is interference with reductive material, it can lead to inaccurate detection results.

3.2 Gas chromatography

This method originated from the 1950s, and it also invented the corresponding detection instrument, so it belongs to a kind of instrument analysis method. The method is mainly used for the gas chromatography. In the 1960s, the method was widely used in residue detection of agricultural products, which was mainly used for detection of pesticides with low molecular weight, easy gasification and strong stability. The test results are obvious, easy to operate, can be widely used, and can even identify multiple components in the same operation, so it is widely used in practice. The detection method requires scientific and reasonable use of chromatographic column and detection equipment. The capillary column is used in the chromatographic column, and the elastic quartz capillary column belongs to the chromatographic column with higher performance. The detection is more accurate. For gas chromatographic analysis, electron capture detector, gas detector and flame photometric detector are generally selected. Electron capture detector can with high selectivity and sensitivity, using radioactive isotopes emit P particle bombardment of the carrier, can produce corresponding reaction of electronegativity, which show a corresponding to peak performance. An ECD detection was used for common pesticides such as organochlorine and pyrethrin. FPD for

phosphorus, sulfur, oh group compounds has relatively high sensitivity and selectivity, belongs to a kind of chromatographic detector, the latter for organic pesticide residues with high sulfur and organic nitrate test results. The NPD is derived from flame ionization detector, which can be used for the effective detection of pesticide residues in organic and organic nitrogen.

3.3 Enzyme inhibition method

Acetylcholinesterase was used to produce corresponding chemical reaction against organophosphorus and carbamate, which can detect pesticide trace and trace condition. This method is easy to operate, fast and low cost, but also has operational limitations. No quantitative qualitative detection can be done. The application scope of detection is limited, and it is easy to be affected by the test results of tomatoes and carrots, which can only be used in the primary detection of organophosphorus pesticide residues. With the development of enzyme inhibition technology, the method is more diversified and can be used to detect the detection of pesticide residue.

3.4 Immunoassay

The specific type of immunoassay can be divided into enzyme immunoassay and immunoassay, which is a practical technique for pesticide residue detection. Enzyme immune technology mainly uses the recognition and combination of antigen and antibody specificity to achieve the monitoring value. Pesticide residue detection technology grows, pesticide research and development also in unceasingly thorough, the use of more standardized scientific pesticide varieties and dosage, need a consensus, thus maintaining human food safety, guarantee the farmers' products and healthy development of the country, for the people to build a healthy diet environment. But also need to constantly improve on the development of technology, for a variety of pesticide residues, residues do more fast and precise detection and reduce the test cost, even can develop more convenient detection method, make people do a good job in agricultural products detecting supervisors, pesticide use normative development.

4. Summary

With the continuous improvement of food safety regulatory requirements, monitor cover the depth and breadth of expanding, sampling sample weight, through the use of efficient and convenient method is selected from a large number of sample a few suspicious positive samples, then use the instrument analysis method for accurate measurement, will greatly improve the monitoring efficiency and reduce regulatory costs significantly. Therefore, it is urgent to establish efficient, rapid and accurate determination method of pyrethrin pesticide residues in fruits and vegetables. The application and promotion of the rapid detection technology of pyrethrum pesticide residues have an irreplaceable effect on the elimination of poisonous food, the market of poisonous fruit flow and the setting of table to prevent the occurrence of poisoning.

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