Role of Near Infrared Spectroscopy in Agriculture

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Abstract
Farmers need non-destructive, accurate, rapid, and user-friendly tools to use on the farm to give them detailed information on the physical and chemical properties of crops at every stage of their growth. They also need to monitor the maturity and quality of their products. Quality control also continues beyond the farm and is necessary for the supply chain and retailing. Near infrared technology, which has been in use for the last four decades, is providing vital solutions in agriculture for these purposes. This is new technology which is very beneficial in the agriculture sectors and also the farmer.NIRS-2500,Near-infrared spectroscopy has been involved in the studied and applied in numerous applications across five key product areas such as fruits and vegetables, meats and fish, beverages and dairy, cereals and grain stocks, grapes, and olives but also areas regarding production factors which really effects i.e. soils and manures, and environmental applications. The mechanisms of near-infrared spectroscopy are well understood and the benefits are clear. NIR spectroscopy can give the fast, rapid, accurate, cost-effective results in the lab or in the field with little or no sample preparation and multiple parameters can measure with the same scan.

Introduction

There is a modern technology in agriculture in which we analyzed the grain nutrition value which increases its effect to the human health. In the market the farmer gets more prices because they can justify its grain quality with the help of this technique. The chain of this analysis is to provide the superior quality nutritional crop which is noticed by this technique. It is a modern tool which works very efficiently to estimate such as in sea food, beverages, fruits, vegetables, meat and fish etc. There are soil and manure two important parameter which really effect their production [1, 2].

Effect of NIRS-2500 in Fruits and Vegetables

The preliminary steps for the application of this instrument are grading and sorting of the given sample which we desire to evaluate exceptionally apples, cherries, avocadoes, peaches and mangoes. This technique was helpful to measure the rapid, non-destructive measurement of several proteins, PH, carbohydrates, ash, fiber, chlorophyll a, chlorophyll b, ash, Vitamin-A and amino acids profile of essential amino acids. In recent time we really need a technology which rapidly and efficiently gives the authentic results which increase the R & D sector efficiency [3].

Effect of NIRS-2500 in Non Vegetarian products

This technique is enabling for the differentiation of proteins, fat, moisture, p^H of the meat. But it can able to recognize the volatile nitrogen content. Al l of the above is important characteristics in meat grading and quality parameter. To control the quality and packaging helps to prevent the common food borne disease [4].

Effect of NIRS-2500 in beverages and dairy products

Through this instrument we can similarly analyzed proximate composition of beverages and dairy products such as protein, fats, moisture, carbohydrate and minerals which are helpful parameter to detect the adulteration in these products. The shelf life depends upon residual moisture content and affects the profit market parameters [5].

Effect of NIRS-2500 in wine and grape production

The fruit and its extract depends upon their ripeness quality which totally affect the flavor of wine and its quality characteristics for example Sugar content, acidity and its pigment which provides the color of the products. In wine industry the grape quality at even number depends upon the time of harvesting.

Effect of NIRS -2500 in Cereals and Feed

The R &D sector analyzed the wheat, barley, rice and soybean which become a guide to recognize the condition of cereals on nutrition bases which effect its quality, grading and mostly price of the products [6].

Role of technique in agriculture

To grow more food grain mostly we depends upon agriculture sectors to increase the grain production from the environment. Due to recent technology the food grain production increasing which is evaluated and improved by this techniques.

Presence of Nitrogen acts as an indicator of protein

By using an instrument we are able to improve the states of crops and also the measures of the growth. In the green leaves plants improves their health due to the presence of green pigment which is well known as Chlorophyll [7].

Role of fertilizer

Recent time fertilizer plays a very important role in the agriculture field so that we need an N-Sensor. Nitrogen very much affects the plant condition. So that it becomes a very important parameter which effect the crop yield and the production of the crop [8].

Wheat

This cereal is very much important in human diet. The protein rich cereal is needed for the growth and to build your body with a right pattern. The nitrogen content and protein has a direct relationship which helps to improve the health of human and also crop. The techniques help the farmers to get more profit by giving the rich nitrogen content measurement.

The modern concept of food of the future

During modern time every day new achievements was occur such as Space mission and Mars mission but we basically need to improve the farming and plant growth. It is an important ramification for planning to meet the dietary needs of these future colonies. The Laboratory of Environmental Biology and Life Support Technology, in partnership with the International Joint Research Center of Aerospace Biotechnology & Medical Engineering at Beihang University, Beijing, China noticed or evaluated the major effects of low intensity light on growth, photosynthesis and the agronomical yield parameters of wheat grain. In modern time the R& D sectors apply an Ava Spec-ULS2048 model of spectrometer which helps to control the different coming source intensity among the various growth stages [9].

Harvest application

The huge amount of harvest products helps to maintain the product quality and reach the market fresh and in desirable form. Through the use of spectroscopy there is no loss of food products also its quality. This technique is very important to select the nutritive parameter which becomes an indicator for the farmer market sales.

Role in fruits

This technique plays an important role in the measurement of Jonagold apples, sweet cherries in Hungary, peaches in Spain, and several varieties of grapes in Italy. The fruits have different parameters which become the marker of the qualification of apple ripeness and quality based on water and soluble sugar content, as well as color.

Role in Sweet Cherries

This fruit annually produced 10-12 thousands tons of cherries. It looks very attractive with their pigment. The pigment acts as an antioxidant which appear due to the presence of anthocyanin pigment a water soluble plant pigment that appears red, blue or purple depending on minute changes in the pH of the plant. It acts as an optimal instrument for working in the red spectra (570-730 nm) and in the NIR (900-970 nm). It is to objectively qualify cherry fruit. The fruit has pigment which provides color, which is a very desirable quality of the consumer and water present inside the fruit [10].

Role in Peaches

The desirable parameter such as ripeness is the most important quality indicator for customers; therefore it is the primary consideration after harvest. This advanced technique can easily and efficiently measure the SSC and water content or moisture content with the help of their spectra.

Role in Milk Production

This technique can also be applied in the dairy industry. Recent time the researchers are capable to estimate the milk content, fat, water content, carbohydrate and minerals which are present in the milk and milk products. In ancient time we use the chemical methods of analysis require specialized personnel, laboratory equipment and are often destructive in methodology. The composition of milk products which was measured in the range of UV (185-210 nm) and NIR (800-2500 nm) wavelength ranges.

Conclusion

Agriculture is a type of agriculture that focuses on producing long-term crops and livestock without harming the environment. In other words, it is a techniques and method that protect the environment, public health, human communities and animal welfare while producing food, fibre, or plant or animal products. It is new term for building agricultural practices more inclined towards nature and human because it enables us to produce healthful food without compromising future generations' ability to the same. This form of agriculture moving around three main components or goals environmental health, economic profitability, and social and economic equality. Most NIR users report significant cost savings and significant time savings when performing their analyses with NIR instead of with wet chemical techniques. After investing in an NIR spectrometer, the break even point is generally reached quickly and the return-on-investment calculations (ROI) show a very positive outcome.

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