

# Research Progress of Nitrogen on Greenhouse Vegetable Cultivation

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## Abstract

**In this paper, by studying the problems faced by nitrogen in the cultivation process of protected vegetables, starting with the growth and quality of crops, the influence of nitrogen regulation on the cultivation of protected vegetables is analyzed in detail, and it is found that the control of nitrogen application and reasonable organic-inorganic combination are analyzed in detail. Shi can provide the best nutrient management model, which is of great significance to the sustainable development of protected vegetables.**

## Keywords

**Facility vegetables; Nitrogen; Nutrients; Fertilization.**

## 1. Introduction

Nitrogen is one of the essential nutrient elements for the growth and development of crops, accounting for about 0.3% to 5% of the dry weight of crops. It is an important part of protein, nucleic acid, chlorophyll, hormones, etc. in crops [1], and it also limits crop growth and yield. And quality is an important factor. Nitrogen sources are essential for the diversity of terrestrial and aquatic organisms, climate change, and human health [2]. Insufficient supply of nitrogen fertilizer will cause slow crop growth and low yield, but too much application can also cause many negative effects. In the growing season of crops, if too much nitrogen is input, the crops will be greedy and late, and will be susceptible to mechanical damage and pathogen invasion. For vegetables, too much nitrogen will reduce the quality of storage and transportation.

## 2. The Influence of Nitrogen on the Cultivation of Greenhouse Vegetables

The development of protected vegetable cultivation in China started relatively late, and the main goal of the early stage was to increase vegetable production as soon as possible and obtain higher income. In the production system of facility vegetable cultivation characterized by high input and high output, some experts and scholars believe that compared with input of other mineral elements, the effect of nitrogen input in increasing production is more prominent. The reason is that nitrogen is absolutely essential. Most crops have the greatest demand and a relatively limited supply of the mineral element from the soil. Due to the low cost of nitrogen

fertilizers, in order to ensure high yields and obtain higher economic benefits, a large amount of nitrogen fertilizers have been used in the production of facility vegetables in my country at this stage. In recent years, the facility vegetable industry in the suburbs of Beijing has developed rapidly. In order to achieve high output and high profit, producers blindly apply a large amount of chemical fertilizers, especially nitrogen fertilizers. Excessive application of nitrogen fertilizer will not only not achieve high yields, but also increase production costs, affect product quality, increase vegetable nitrate content, reduce nitrogen utilization, and increase apparent nitrogen loss. Xu Kunfan et al. [3] showed that with the increase of nitrogen application, the nitrate content of cucumber fruits increased significantly, and the nitrogen application rate was significantly positively correlated with the nitrate content. The application of nitrogen fertilizer resulted in the increase of vegetable nitrate content. The direct cause. Therefore, agricultural workers began to focus on how to fundamentally take effective measures to reduce the nitrate content of facility vegetables, improve the product quality of facility vegetables, and protect the health of human life. With the strategic adjustment of the agricultural structure in the suburbs of Beijing, as an important economic crop, the planting area, variety and quantity of protected vegetables are further expanding. In recent years, with the continuous improvement of people's living and consumption levels, more and more attention has been paid to the nutritional quality and safety of vegetables. People's attention has gradually shifted from the quantity type to the quality type. Therefore, with the increase in the production of vegetable The quality problem of the plant will also become one of the objective and necessary conditions for the sales of facility vegetables. Extensive application of nitrogen fertilizer can also cause soil nitrogen accumulation, soil acidification, and reduce soil quality [4]. In vegetable production, excessive input of nitrogen fertilizer causes a large accumulation of nitrogen in the soil, resulting in an imbalance of soil nutrients. The results of Du Lianfeng et al. [5] showed that the amount of nitrogen fertilizer in the soil is directly related to the accumulation of nitrate content in plants and groundwater. Due to the large amount of nitrogen applied in vegetable fields and orchards in the suburbs of Beijing, the nitrate accumulation in the soil is obvious. The rate of salt exceeding the standard is high. As the world's largest fertilizer production and consumption country, China's chemical nitrogen fertilizer consumption reached 23.942 million tons in 2013[6]. In 2014, the amount of nitrogen fertilizer used in Beijing was 53,678 t. Although the amount was 10% lower than that in 2013 [7], the amount of nitrogen fertilizer was still excessive due to the reduction of arable land due to afforestation in the plains. The soil nitrogen surplus in the suburbs of Beijing is the largest, and the agronomic use efficiency is only 24.2%. A large amount of nitrogen fertilizer remains [8], causing serious soil pollution. The phenomenon of greenhouse abandonment due to the deterioration of soil quality is increasing. In recent years, the pollution of nitrate nitrogen in the intensive protected area planting area in Shouguang City is quite serious. In 2007, Song Xiaozong tested 292 irrigation water samples in Shouguang City, and the results showed that 59% of groundwater nitrate nitrogen levels exceeded 10 mg/L (World The health organization (WHO) established drinking water nitrate content standards), the reason is closely related to the massive application of nitrogen. There are also some studies that have proved that fertilizer nitrogen applied to the soil is easier to leaching from the soil than natural nitrogen sources [9], and the phenomenon of excessive nitrate content in groundwater is closely related to excessive application of nitrogen [10-11], the amount of nitrogen applied , Fertilization methods will also directly affect the conversion of nitrate nitrogen in the soil [12-13]. Nowadays, how to improve the utilization efficiency of nitrogen fertilizer in the facility vegetable field, reduce the pollution of the soil environment by the nitrogen fertilizer application, reduce the production cost, improve the economic efficiency, and promote the high-quality, high-yield and sustainable development of facility vegetables are problems that must be studied and solved.

### 3. Suggestions and Prospects

The nitrogen fertilizer optimization operation research model of the facility vegetable industry is an important guarantee for the sustainable development of facility vegetables. The problems of farmers' habit of nitrogen application should be comprehensively analyzed in facility vegetable planting. On this basis, research the optimal nitrogen application rate required for the growth of facility vegetables, and control the use of different types of nitrogen fertilizers, such as organic fertilizer and slow and controlled release coated urea. To find the best nutrient management mode from the two aspects of controlling the application of nitrogen and the combined application of organic and inorganic, so as to screen out the best fertilization program. Combining crop yield and quality, soil environment and economic benefit evaluation to find the best fertilization mode, while ensuring that the yield of vegetables can be increased and the quality of vegetables is guaranteed to obtain the best economic benefits, it can minimize the impact of nitrogen fertilizer input on soil quality and the environment. The negative impact of this is of great significance for effectively improving the extensive nutrient resource management methods of the facility vegetable production system, and for the optimization of nitrogen management with the goal of sustainable and efficient use of facility vegetable soil resources.

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