Effect of nitrogen fertilizer on dry matter accumulation of maize

Miao Zhong

Chengdu radio and television university, research direction: crop cultivation Chengdu, Sichuan 610000, China.

Abstract

In this paper, the relationship between nitrogen fertilizer absorption, dry matter accumulation and distribution of different maize varieties was studied through literature review, and the status quo of nitrogen fertilizer in maize production was discussed, which laid a foundation for further research on nitrogen fertilizer application level.

Keywords

List Nitrogen fertilizer; Corn; Dry matter accumulation.

1. Important status of maize production

Corn is the second largest crop after rice, and it is playing an increasingly important role in China's grain production. With the improvement of people's living standard and the development of animal husbandry, the demand for corn is on the rise. In addition to the limited arable land area, how to improve the yield per unit area of corn, to meet market demand, is a difficult and outstanding problem. Corn is a grain, economic and forage crop which is mainly used as forage. Under the premise that the area cannot be increased, the demand of the society can only be met by improving the quality of corn [1]. Therefore, the development of maize must focus on improving yield per unit area and quality, and at the same time meet the needs of value-added transformation, so as to improve the overall agricultural benefits, increase farmers' income, and promote the realization of the goal of building a well-off society in an all-round way.

2. Importance of nitrogen fertilizer in maize production

The amount and proportion of nitrogen, phosphorus and potassium absorbed by maize increase with the increase of water yield. There is less nitrogen and phosphorus in the soil. On average, it takes 2.6 kg of nitrogen, 1.21 kg of phosphorus and 2.18 kg of potassium to produce 100 kg of grain. The ratio of n, p, k absorption is approximately 1:0.46:0.84. This quantity and proportion can be used for reference when formulating fertilization plans . In recent years, available potassium in soil decreased at the rate of 2-4 mg/kg per year, and the area of potassium deficiency continued to expand. But the knowledge of applying potash fertilizer to maize is insufficient in some areas. The field experiment showed that the application of organic fertilizer and straw could not meet the need of maize growth, and the effect of increasing potassium fertilizer was obvious. In order to meet the growth demand of corn for potassium, in high-yielding fields, the appropriate amount of potassium application is 4-8 kg, mu, not more than 10 kg, mu; The middle field is 4-6 kg, mu, not more than 8 kg, mu; Low yield fields should be 3-5 kg/mu, no more than 6 kg/mu. Nitrogen: phosphorus: potassium reached 1:0.5.6. N was the highest, K was the next, P was the least. N, K, and P were the highest, followed by N, K, and P, respectively, for nitrogen uptake and utilization among maize varieties. Nitrogen is an essential nutrient for the growth and development of maize. Nitrogen fertilizer is the main source of nitrogen in maize. Nitrogen fertilizer is the most widely used chemical fertilizer in the world. It is widely used in both developing and developed countries. Adequate fertilization is one of the key technologies to ensure high yield of corn. At present, there are many varieties of fertilizers, and the fertilization methods tend to be diversified. How to ensure scientific and economic use of fertilizers, and ensure that maize does not lose fertilizer in the later growth stage is particularly important [2].

Different nitrogen fertilizer application methods have different effects on maize production. Therefore, it is of great significance for maize production to find efficient and practical nitrogen fertilizer application methods [3].

Corn is a high-yield crop that needs more fertilizer, and corn is a high-yield crop that needs more fertilizer. During its growth and development, it needs to absorb a lot of nutrients, among which nitrogen, phosphorus and potassium are the most needed, followed by calcium, magnesium, sulfur, boron, zinc and manganese. According to corn demand law and production practice, corn fertilization should follow basic fertilizer as the main, top fertilizer as the supplement; Nitrogen fertilizer is the main, phosphorus fertilizer is the auxiliary; Ear fertilizer is the main, while granule fertilizer is the auxiliary [2].

The utilization rate of fertilizer directly affects the dry matter accumulation of corn, which is the material basis for the formation of crop yield, and its accumulation and transfer to seeds determine the level of yield, and the absorption of nutrients and the operation of assimilates are the basis for the formation and accumulation of dry matter [4].

3. Differences in nitrogen uptake and utilization among maize varieties

As early as the beginning of the 20th century, it was recognized that there were genotype differences in the utilization of nitrogen in maize. Hoener reported the genetic differences in the uptake and utilization of nitrate between the high protein corn lines of ilinus and the low protein corn lines. At low nitrogen level, the yield of the low protein variety was higher, while at high nitrogen level, the yield of the high protein variety was higher. Chenalier believed that the difference in nitrate nitrogen absorption between maize hybrids and inbred varieties could be from 8 weeks to 12 weeks [5]. Yin et al. showed that the difference in fertility of maize varieties was mainly reflected in yield, green leaf area, leaf area per plant and growth period, etc., while plant height, ear height and leaf number were all less affected by fertility. Under low fertilizer conditions, types with high absolute yield were barren tolerant. Two common maize hybrids and their parents were used as materials, and the results showed that the reaction of the hybrids to nitrogen at different nitrogen levels could be divided into three types: sensitive type, insensitive type and intermediate type [6]. Moll (1982) [7] decomposed the determinants of nitrogen efficiency into nitrogen absorption efficiency, nitrogen utilization efficiency and nitrogen transfer efficiency, and found that the difference in nitrogen efficiency under low nitrogen condition was mainly caused by the difference in nitrogen utilization efficiency of accumulated nitrogen. Under high nitrogen condition, nitrogen absorption efficiency plays a major role.

So far, the crops related to the genotype differences of plant nitrogen efficiency have been involved in maize, wheat, oats, rice, sorghum, ryegrass, potato, tomato, cotton, soybean, peanut, apple and many other types of crops

The results showed that the genotype difference of nitrogen efficiency was a common phenomenon. These studies have laid a certain research foundation for the efficient utilization of crop nutrient resources, and it has also been proved to be a feasible way to improve the utilization efficiency of nutrient resources by using nutrient efficient varieties. Therefore, the basic research on the selection of varieties with low nitrogen tolerance and high efficiency and the mechanism of nitrogen efficiency difference is of great long-term significance.

4. Effects of different nitrogen application rates on dry matter of maize varieties with different nitrogen efficiency

The effects of different nitrogen levels on plant height and panicle position of maize showed a consistent trend. The spike height increased with the increase of nitrogen level. Under different nitrogen levels, the changes of ear length, row number of ear and row grain number were based on stability, and the change of hundred-grain weight was large. The effects of different characters on the traits of the same variety were slightly different. Zhang shuping [8] showed that the yield of maize

varieties increased with the increase of nitrogen level, and the yield of maize varieties increased with the increase of nitrogen fertilizer application, and nitrogen fertilizer had a significant impact on the yield of maize. Liu jian 'an[9] analyzed the difference of nitrogen nutrition among different maize varieties from the perspective of nitrogen efficiency, and the results showed that high-yielding maize varieties selected at the high nitrogen level did not necessarily show the same high yield at the low nitrogen level. Pu zhongze[10] studied the difference of nitrogen use efficiency among different rice genotypes and found that the nitrogen use efficiency was higher under the condition of no nitrogen application than under the condition of nitrogen application. In the phenotypic shape of maize investigated by Zhang xinghua. The variation coefficient increased to different degrees with the decrease of nitrogen application level except the quality of 1000 grains, indicating that the phenotypic difference between varieties at low nitrogen level was greater than that at high nitrogen level.

5. Effects of different nitrogen application rates on dry matter and nitrogen accumulation and distribution of maize varieties with different nitrogen efficiency

Photosynthesis is the basis of crop yield formation, and nitrogen fertilization can enhance photosynthesis, thereby increasing maize yield. The application of nitrogen fertilizer can increase the photosynthetic area, improve the photosynthetic capacity and extend the photosynthetic time. For example, excessive nitrogen fertilizer leads to excessive growth, large and dark green leaves, long growth of plants, soft tissue, and delayed growth period, leading to deterioration of light and ventilation conditions, decreased photosynthesis, and enhanced respiration, which eventually leads to reduced production. Hao jianjun [11] concluded that nitrogen supply must be appropriate to maintain the C/N ratio at an appropriate ratio. For example, excessive nitrogen leads to over-exuberant growth of plant nutrients, and more photosynthetic products are used for growth and less for the storage of stem sheath, thus reducing the redistribution to seeds.

6. Current situation and problems of application of nitrogen fertilizer on maize

Fertilization is one of the basic measures to increase agricultural output and income. The use of chemical fertilizers and pesticides can, to a certain extent, increase grain output, reduce losses caused by agricultural disasters and improve efficiency. However, long-term and massive use of chemical fertilizers and pesticides not only aggravates environmental pollution, but also leads to the decline of soil fertility, which has become a major problem affecting the sustainable development of agriculture [12]. Nitrogen fertilizer is the most widely used chemical fertilizer in the world. It is widely used in both developing and developed countries. Adequate fertilization is one of the key technologies to ensure high yield of corn. At present, there are many varieties of fertilizers, and the fertilization methods tend to be diversified. How to ensure scientific and economic use of fertilizers, and ensure that corn does not lose fertilizer in the later growth stage is particularly important [13]. In the process of nitrogen fertilizer application due to improper application caused a lot of waste, reduce food production, pollution of the environment, waste of earth resources.

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