

# Progress of Research on the Current Status of Maize Cultivation with Different Functions and the Influencing Factors of Nutrient Uptake in Southwest China

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## Abstract

Through the analysis of the current situation of corn planting, characteristics, and the use of corn fertilizers and pesticides in the South and Southwest regions, as well as the research related to the three different functions (seed, silage, and fresh food) of corn, we analyze the important influencing factors affecting corn yield, and look for a reasonable optimization plan of corn planting for corn planting in Southwest China; the literature study found that: Southwest China's corn planting is mainly located in the karst mountainous areas, with poor production conditions. In addition, human-animal and mechanical operations coexist, the comprehensive mechanization level is insufficient, multi-maturity intercropping and stubble net crop replanting, while small farmers and moderate-scale production and management coexist. Lack of mechanization, light and simplified standardized technology and regional technology models that are innovative and can be widely applied on a large scale; more influencing factors affecting the yield of the three different functional maize, mainly varieties, density, water, fertilizer and water-fertilizer inter-cropping, and inter-cropping among nutrients also affects the uptake of goat's milk powder by the plant. Southwest cultivation management mode, through the coordinated management of water and fertilizer, the yield difference of the reduction. Analyze the nutrient uptake pattern of maize with different functions (silage, fresh food), in different growth periods. Analyze the nutrient accumulation pattern of different organs of corn (silage, fresh food) in different periods. Need to do a lot of work.

## Keywords

Maize; Yields; Regional Technology Models.

## 1. Introduction

Maize (*Zea mays* L.) has become one of the important food crops as a cereal crop that provides a wide range of nutrients needed by humans and animals, providing about 15% of the protein and 20% of the calories in the food dietary structure (Cakmak, 2008; Nuss and Tanumihardjo, 2010). Edible maize provides energy as well as a large amount of trace elements (Zn, Fe) and vitamins, etc. (J.I. Ortiz-Monasterio et al., 2007), and silage maize, with its high crude protein, non-structural carbohydrates, and low content of lignin, serves as the most suitable cultivated forage, providing a large amount of nutrients for high-quality meat and milk.

Since the new century, China's corn production has increased substantially. Currently, China's maize production accounts for 23.49% of the world's (FAO, 2014), and by 2015 China's maize sown area accounted for 32.93% of the country's grain sown area, with a yield of 5.89 tons per hectare (NBS, 2017). However, in the future, China will still need to continue to produce higher seed yields than the current 30-50% on its limited arable land area (Zhang et al., 2013).

However, maize cultivation in China is unevenly distributed between the north and the south, mainly in a belt-like distribution to the northeast to the southwest (Wu et al., 2015), and the southwest region, as one of the four major maize-producing regions in the country, accounted for 12.89% of the country's planted area in 2015, and 10.81% of the country's yield, with yields much lower than the national average (National Bureau of Statistics, 2017). Southwest corn planting is mainly distributed in karst mountainous areas, with poor production conditions (Liu Yonghong et al., 2017), the coexistence of human and animal and mechanical operations, the level of comprehensive mechanization is less than 40%, and multi-maturing intercropping and stubbing net cropping and replanting, as well as the coexistence of small-scale farmers and moderate-scaled production and operation. There is a lack of mechanized, light and simplified standardized technologies and regional technology models that are innovative and can be widely applied on a large scale.

During the new century, at least 30-50% of crop yields in intensive high-yield production systems were attributed to the application of fertilizers, especially nitrogen, phosphorus, and potash (Stewart et al., 2005). However, fertilizer application during maize production has negative impacts on the environment, and the large amount of fertilizer application has brought about major environmental problems such as global warming, soil acidification, and water eutrophication (Tilman et al., 2011; Smith et al., 2012; Lu and Tian, 2012). Therefore, high productivity and high efficiency to reduce environmental costs have become a hot topic for our attention. Nutrient inputs and outputs and environmental costs are extremely unbalanced, which is not in line with the new idea of sustainable development of high-yield and high-efficiency production of maize in the new century.

## 2. Status of Maize Cultivation in Southwest China

China's southern grain corn 89 million mu, accounting for 17% of the national corn planting area, mainly concentrated in the southwest region of the Sichuan Basin and the Yunnan-Guizhou Plateau mountains; southern fresh corn planting more, planting area of 10 million mu, accounting for 55% of the national corn planting area, mainly planted in the south along the rivers and around the sea area; the south of the green corn planting area of more than 5 million acres, accounting for 16% of the country, mainly planted in the southwestern region; grain corn shortfall of more than 35 million tons of fresh corn exports to generate foreign exchange, the green corn in strong demand.

For the Southwest region corn planting status in the past 10 years, the past 10 years, the Southwest region corn planting area has a trend of growth, tends to close to 5 million hectares, the past 5 years, the planting area of slow growth; total output in the past 10 years of change also tends to grow, the growth rate has become slower; unit production is also tends to grow, in 2015 the unit production is close to 5000kg/ha; due to the characteristics of the Southwest region planting mode, the total yield increase by the unit area yield impact is significant.

Southwest region provinces corn planting area in the past 10 years growth or flat trend; planting area ranked in order: Yunnan, Sichuan, Guizhou, Guangxi, Chongqing, Sichuan and Yunnan planting area are basically more than half. Among them, in the past 10 years, Yunnan planting area increased by a large margin, followed by Sichuan, Guizhou and Chongqing planting area basically remained unchanged. From the point of view of the yields of different provinces, the corn yields of each province also increased over time, Chongqing has the highest

yields, Yunnan has a large planting area, the yields are not the highest, indicating that the corn planting management mode in Yunnan Province needs to be improved.

China's northeastern corn production area yield potential and the actual yield basically match, basically no room for improvement, the region's corn planting management mode is more perfect, North China has a certain yield potential, 1.3Mg/ha; Northwest production area of the yield potential is the largest, up to 2.2Mg/ha; Southwest China is the next largest, the yield potential of the second, for the 1.8Mg/ha. Northwest China has a related to improve quality and efficiency of the research, while the related research in the southwest region is blank, which is worth studying.

### 3. Characteristics of Maize Cultivation

Southern maize cultivation and northern maize cultivation mode differences are more significant. In particular, the southwest mountain maize ecological zone of the ecological conditions of the greater differences, vertical distribution is very obvious, agricultural three-dimensionality is stronger, the production of poorer conditions, dry soil slopes, fragmented plots, soil hemorrhoids, and rain-fed agriculture, droughts and floods are very frequent; planting characteristics: maize in the south planting season there are spring, summer, autumn and winter sowing coexist, of which spring maize accounted for 70%, human and animal and mechanical operation coexisting type of planting, the integrated Mechanization level is less than 40%, multi-maturity intercropping and stubble net crop replanting coexist, mostly small farmers and moderate-scale production and management coexist.

China's southern corn planting conditions are relatively poor, corn planting management mode also has a bigger problem, from the technical point of view, the southern corn planting management lack of innovative and can be widely used mechanization, light simplification of standardized technology and regional technology model. At present, the total amount of fertilizers and pesticides per hectare on the production of maize in the southern region on average 347 kg, 15 kg, and the amount of fertilizers and pesticides in the southwest region is higher, much higher than the national average. Maize cultivation in the southwestern part of the Karst is mainly distributed in mountainous areas with poor production conditions. Systematic research is needed to characterize the nutrient requirements of different types of maize and pest control indicators. No mechanization and lightweight. Simplified and standardized techniques and regional technical models cannot be popularized on a large scale. This also hinders the narrowing of yield differentials in the Southwest.

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