

# A Summary of Studies on Mung Bean Typical Intercropping Models

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## Abstract

**Through consulting a large number of related literatures, it can be seen that mung bean and other crops intercropping have different effects on the output and economic benefits of mung bean. Different intercropping models also have a great impact on economic benefits. The effect of different intercropping modes of peanut on the benefits and the yield and growth of mung beans and the advantages of intercropping.**

## Keywords

**Green beans; Corn; Millet; Peanut; Cotton; Intercropping.**

## 1. INTRODUCTION

Mung bean is native to China and is an important miscellaneous grain and export agricultural product. Mung bean has the advantages of short growth period, drought tolerance, infertility, and nitrogen fixation. It is the main economic source of economically underdeveloped areas such as remote mountain areas in China. Preferred crop. Mung beans are rich in nutritional health factors such as protein, vitamins, flavonoids, etc. It has the effects of clearing heat and removing heat and lowering blood fat, and can also effectively improve people's dietary structure. Therefore, the prospects for mung bean production and consumption demand are considerable. [1]

With the growth of population and the development of the commodity economy, the reform of the grain farming system has been changed from one crop to one crop per year to two crops per year. Important way. [3] To this end, in recent years, many places have carried out reforms and experiments on intercropping of various crops such as cotton, grain, and beans, constantly promoting new ideas, providing farmers with key cultivation techniques and guidance, and providing benefits for the healthy development of local agriculture Technical services. [3] Because the growth characteristics of mung bean are wide adaptability, drought resistance and waterlogging resistance, the requirements for fertility conditions are not strict, a good variety can be planted all over the country, the growth period is short, adopt protective cultivation measures, can be early It is harvested in the middle and late June, so it is feasible in time to practice mung bean intercropping with other crops, and mung bean uses land and solar energy resources in early spring, and intercropping crops use land and solar energy resources in the middle and late stages to achieve full The purpose of using natural resources to increase economic efficiency. [2]

## 2. MUNG BEAN AND CORN INTERCROPPING

### 2.1. Effect of Different Intercropping Modes of Mung Bean and Corn on Benefit

Intercropping is the method of planting two or more crops with similar growing seasons in the same fast field at the same time or in the same season in rows or belts. The effect of different

intercropping modes on different crops is also relatively large, and the reasonable intercropping mode can improve the economic benefits of mung beans. Intercropping of beans and corn is a typical planting model. Studies have shown that the three-dimensional planting model of corn and mung beans can make full use of resources such as light, heat, water, fertilizer, etc., and achieve higher economic benefits and better results on the same land. Ecological Benefits. In the ratio of intercropping, 4: 4 or 4: 8 intercropping of corn and mung bean is the ideal planting mode. The total output value of 4: 4 intercropping of corn and mung bean is the highest, and the highest net income of 4: 8 intercropping of corn and mung bean. The best intercropping ratio in different regions is also different. Some scholars have shown that the drought and less rain in western Liaoning are more suitable for mung bean growth, and the 4: 8 intercropping model of maize and mung bean is suitable, and the rain in South Liaoning is plentiful, which is more suitable for corn growth. The 4: 4 intercropping mode of corn and mung bean, in the actual production process, you can choose the intercropping mode according to the local actual situation. [4]

The impact of the intercropping ratio is also different in different aspects. From the aspect of economic benefit, Lili Cai obtained the intercropping ratio of the green bean and corn intercropping with the maximum economic benefit of 2: 1 through six different treatments of the green bean and corn intercropping experiment.[13] From the perspective of the total economic benefit of the composite group, Feng Yan and other studies have shown that when the intercropping ratio of mung bean and corn is 6: 4, the total economic benefit of the composite group is the highest. [14] In recent years, more and more scholars have conducted this research on the intercropping mode of mung bean and corn. The experimental results show that under the same geographical conditions and reasonable field management measures, the planting mode of maize intercropping mung bean can be properly configured. The structure of the composite group fully exploited the respective productivity of mung bean and corn, thereby achieving a higher comprehensive benefit.[13] With the restructuring of China's planting industry, the benefits of corn and mung bean single cropping are getting lower and lower, and intercropping of mung bean crops with corn can effectively increase economic benefits and protect farmers' income.

## 2.2. Effect of Mung Bean and Corn Intercropping on Mung Bean

The intercropping of corn and mung bean has an impact on the output of mung bean, but it improves the overall comprehensive benefit of the composite group. Kong Qingquan's experiment showed that in the intercropping of corn and mung bean, the output of corn can reach 600 ~ 800kg / 667m<sup>2</sup>; the output of mung bean is 50 ~ 70kg / 667m<sup>2</sup>. In other words, under the condition that the yield of corn is basically not affected, it can receive 50-70 kg of mung beans and increase the income of 300-420 yuan (converted by 6 yuan / kg of mung beans and 1.2 yuan / kg of corn), and the effect of increasing production and income can be achieved. [6] Although corn and mung bean intercropping has achieved the goal of increasing production as a whole, the advantage of this intercropping is at the expense of the actual output of mung bean. Xiujie Ma research shows that the number of pods and pods per plant in mung bean and corn intercropping is less than that in mung bean monoculture, and the yield per plant is reduced by 20.6%. [9] Because in the corn and mung bean intercropping model, the plant height of corn has an absolute advantage over mung bean, and it can have a shading effect on mung bean, thereby affecting the photosynthesis of mung bean. The performance is that the mung bean plant is long and the pods are scarce; the second reason It is in this intercropping mode that the root system of corn is well developed and the ability of absorbing nutrients is strong, so that mung beans are in a disadvantaged position in the process of competing for nutrients. The marginal effect of the mung bean and corn intercropping model has improved some agronomic traits of corn, while some of the mung bean traits have been weakened. [7] Although

the intercropping of mung beans and corn affects the photosynthesis of mung beans, a reasonable intercropping model can avoid these problems, and ultimately increase output under a reasonable intercropping model.

### **3. MUNG BEAN AND MILLET INTERCROPPING**

#### **3.1. Effect of Different Intercropping Modes of Mung Bean and Millet on Benefit**

Mung bean and millet are common drought-tolerant crops in the north. Mung bean has high economic benefits. Millet is drought-tolerant and barren. Therefore, the cultivation mode of mung bean and millet intercropping can effectively reduce the yield reduction and frequent pests and diseases caused by repeated cropping. Mung bean and millet intercropping can improve the efficiency of light energy utilization. In addition, the intercropping mode crops have different depth distribution of underground roots, which can reasonably use water and fertilizer. Millet and mung bean intercropping is a typical planting method in the production of arid and semi-arid areas in western Liaoning Province. Under the same geographical conditions and reasonable field management methods, the millet and mung bean intercropping model can be fully Mining the respective productivity of mung bean and millet to achieve a higher comprehensive benefit, but currently there are few research results on the exploration and optimization of the intercropping mode of millet and mung bean. [8] Scholars from the Liaoning Academy of Agricultural Sciences have shown that the millet plant in the 4: 2 intercropping mode of millet and mung bean is up to 135.8 cm, the stem thickness is 0.65 cm, the stem mass is 10.1 g, the ear length is 21.5 cm, and the single ear mass is 18.3 g, generally higher than 2: 1 intercropping and monocropping millet, intercropping mode can also activate millet antioxidant enzyme activity; root length and plant height of intercropping mung bean increase, and 2: 1 intercropping mode of millet and mung bean is greater than 4 : 2 intercropping models. The main stem branching number, pod number per plant, pod length, pod number, and 100-grain quality of intercropping mung bean are lower than monocropping mung bean, but the overall economic benefit is greater than monocropping. Experiments by scholars in Henan Province showed that the 4: 2 intercropping model of millet and mung bean has the highest economic benefit and profit, with a net profit of 22,185.93 yuan / hm<sup>2</sup>, which is an increase of 27.1% compared to single crop millet and a 3.95-fold increase compared to single crop green bean. [8] Experiments by scholars show that a reasonable intercropping model can achieve the effect of increasing economic benefits.

#### **3.2. Effect of Mung Bean and Millet Intercropping on Mung Bean**

Mung bean and millet intercropping have different effects on the biological characteristics of mung bean at different growth stages, and lead to differences in final yield and product quality. Xiujie Ma studied the effects of different growth stages on mung bean and millet intercropping on mung bean. In the seedling stage, the effect of intercropping was not obvious. From jointing stage to flowering stage, mung bean and millet intercropping have shown certain advantages in plant height, leaf area and dry matter weight per plant. In the mature stage, the influence of mung bean and millet intercropping on the number of pods per plant, yield per plant, number of grains per pod, weight per hundred seeds, number of branches, etc. is more obvious. The intercropping method of mung bean and millet finally realized the increase of mung bean yield. The number of pods per plant and output of mung bean were higher than that of single-plant mung bean. The yield reached 1404.48 kg · hm<sup>-2</sup> and the mung bean yield increased by 3.83%. [9] At the same time, mung bean and millet intercropping can increase the crude protein content of mung beans and reduce the fat content. Mung bean and millet intercropping can achieve the purpose of increasing yield and can improve crop quality, showing the advantages of this farming method, suitable for Used in practice. [9] The increase in yield and quality naturally increases the economic benefits of planting, so mung bean and millet intercropping is

a better intercropping method. In agricultural production, it is very important to choose the appropriate crops for intercropping to increase crop yields and increase economic benefits. [9]

## **4. MUNG BEAN AND COTTON INTERCROPPING**

### **4.1. Reasonable Intercropping Mode of Mung Bean and Cotton**

The intercropping of mung beans and food crops is a traditional Chinese agricultural planting mode. A reasonable intercropping mode can not only increase the output per unit of land area, make full use of resources such as light, heat, water, and soil, but also improve the quality of crops and improve the physical and chemical properties of soil, fertility, etc. [10] Scholars in different regions have obtained suitable intercropping models through experiments. Scholars in Hebei Province have shown that through the discussion of cotton-mung bean intercropping models, a reasonable intercropping model suitable for low-yield cotton-mung bean fields in Hebei Province has been selected For the large row spacing of cotton 90 cm and the small row spacing of 60 cm, plant one row of mung beans in the large row of cotton. [10] Moreover, the cotton-mung bean intercropping model has higher chemical fertilizer absorption and fertilizer utilization than cotton single cropping model. Nitrogen fertilizer utilization rate is the highest, which may be related to the nitrogen fixation of mung bean. [10]

### **4.2. Mung Bean and Cotton Intercropping Advantages**

In recent years, with the fluctuation of cotton prices, the comparative profit of cotton has decreased, and the intercropping model of cotton and mung bean can not only make full use of resources such as light and heat, soil nutrients, but also improve soil fertilization and nitrogen fixation, and the intercropping model saves time and money work. [23] Cotton and mung bean intercropping technology is to use cotton to plant a line of short-growing mung beans during the period from sowing to pre-closing, harvesting mung beans before cotton sealing, to improve land utilization and planting efficiency. Mung bean plants are short, have short growth periods, and nodules also have a nitrogen fixation effect, which neither affects cotton growth nor cotton yield. Under the premise of not affecting the normal growth and yield of cotton, cotton intercropping with mung beans can increase the mung bean yield by 30-45 kg per mu. After deducting the cost of topdressing the mung bean, the gain per mu is 125-200 yuan. Cotton and mung bean intercropping is an efficient cultivation model summarized in the cotton area of Hebei Province. This intercropping model saves time and labor and is easily accepted by farmers. It is popularized in Handan, Cangzhou, Hengshui and other places in Hebei Province. [24] Experiments by scholars in Qiu County, southern Hebei Province show that without affecting cotton output and increasing labor intensity, it is possible to produce mung beans 40 to 50 kg per mu and an increase of about 300 yuan per mu, which can effectively improve planting efficiency and increase. Farmer benefits. [23]

The principle of the advantage of mung bean and cotton intercropping is to use the growing season, the growth period of mung bean is only 60 ~ 70 days. In the early stage of cotton growth, planting an early-mature mung bean can use the low-temperature season and light-heat resources of the cotton in the early stage to increase the season of mung bean; to achieve the combination of land cultivation and cultivation, cotton is a deep-rooted crop, mung bean is small and shallow, both can be used Different levels of soil nutrients. Mung bean rhizobia can fix free nitrogen in the air. Mung bean leaf vine is a good green manure. Intercropping an acre of mung beans can increase the green body by about 200 kg, which contains organic matter 82.5%, nitrogen 0.56%, phosphorus pentoxide 0.09%, potassium oxide 0.5%; the use of light energy, early cotton growth, serious light leakage between rows, to the present The leaf area coefficient at bud stage is only about 1.0. Planting a crop of mung bean makes full use of the light leakage in the early stage of cotton to form a one-season crop yield. [12] Xiaoyan Dang and others

believe that the advantage of intercropping cotton with other crops is that the efficiency of nutrient absorption is increased. [16] Cotton or mung bean intercropping can not only improve economic efficiency, but also reduce the use of chemical fertilizers and improve the quality of cotton through the nitrogen fixation of mung beans. [10]

## 5. RESEARCH STATUS OF INTERCROPPING MODE OF MUNG BEAN AND PEANUT

Peanut and mung bean interplanting refers to a method of planting mung beans among peanut ridges. Interplanting peanuts and green beans can increase the multiple cropping index, make full use of temperature, fertilizer, water and land resources, and greatly improve economic efficiency. [11] The test results in Shanxi Province show that the peanut plants are short, suitable for dense planting in rows, and the row spacing of plants suitable for mung bean planting is 30 cm × 14 cm. In the mung bean-peanut intercropping model, agronomic measures such as density and fertilization are the main factors affecting the growth and yield traits of mung bean. [25-26] Yield is also restricted and affected by many factors such as temperature and rainfall. Variations vary, so the representativeness of the model still needs further experimental research to improve its reliability and representativeness. [11]

## 6. CONCLUSION

Crop intercropping is a great creation of China's traditional agriculture and has a long history. Reasonable intercropping of crops can not only improve the utilization efficiency of resources such as light, heat, water and nutrients, but also effectively reduce the damage caused by diseases, insects, grass, etc., reduce the application of fertilizers and pesticides, improve the ecological environment of farmland, and reduce production Cost, increase group output and overall economic benefits. [8] The intercropping model has the advantages of improving the ventilation and light transmission conditions of crop groups, improving the utilization of light energy, land, water and fertilizer, and improving soil quality. It can effectively promote agricultural production and farmers' income, and has achieved obvious economic, social and ecological The benefits have made great contributions to the high-quality development of China's agriculture. [8]

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