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## **The study on the mathematics model of forage type mulberry high-output cultivation and optimizing plan**

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**Key words** : forage type mulberry (*Morus alba* L.), high-output and high-effect, mathematics model, optimization of cultivation technique, orthogonal rotatable central composite design

In recent years, Chinese scientists have cultivated a *Morus Alba* through artificial selection and crossbreeding. They have cultivated the newest resistance strain with strong regional compatibility. *Morus Alba* has both ecological and nutritional value and its palatability is high too. It was predicted to be the most potential ligneous forage plant.

In order to establish an optimized cultivation technical standard of *Morus alba* with high-effect production, Orthogonal rotatable central composite design and five factors (nitrogen fertilizer, phosphorous fertilizer, potassium fertilizer, fertilize times, mowing times) were adopted to study the relationship among leaves yield, branch yield, major cultivation techniques and income.

We clarified the key factors influencing forage *Morus alba* and found the comprehensive cultivation techniques by establishing mathematical model and its analysis which supplied scientific foundation for higher yield and effect cultivation of forage *Morus alba* in areas of old Yongding River.

We analyzed the regression equation with statistical optimum choosing, dimension reduced and margin effect. The results showed the optimum cultivation techniques as follows: nitrogen fertilizer (60 kg per 667 m<sup>2</sup>), phosphorous fertilizer (30 kg per 667 m<sup>2</sup>), potassium fertilizer (40 kg per 667 m<sup>2</sup>), fertilize 3 times (May 15, June 30 and August 15 in each year, respectively), mowing 3 times (June 10, July 30 and October 10, respectively).

The highest yield of *Morus alba*'s leaf was 700.62 kg per 667 m<sup>2</sup> in 2007. According to the importance of each factor, the order was: fertilizer frequency, mowing frequency, phosphate fertilizer, nitrogenous fertilizer and the potassium fertilizer. The highest yield of *Morus alba*'s branches and leaves was 1260.71 kg per 667 m<sup>2</sup> in 2007, the order was mowing frequency, applying fertilizer frequency, potassium fertilizer, nitrogenous fertilizer and the phosphate fertilizer.

In this paper, analyzing methods such as regression equation, statistical optimum choosing, analysis of dimension reduced and margin effect have been used to analyze the result data. The relationships between each factor and the yield of *Morus alba* were all in line with twice-kind parabola. The highest interrelated numerical values between each factor and the yield presented on level 0 of experimental code. As far as the production of *Morus alba*'s leaves was concerned, there are interactions among factors. The most obvious interaction was the one between the nitrogenous fertilizer and the mowing frequency and then between the nitrogenous fertilizer and the mowing frequency: In yields of branch and the total yields, the most obvious interaction was the interaction between the nitrogenous fertilizer and the phosphate fertilizer and then between the nitrogenous fertilizer and the potassium fertilizer. Among the different cultivation measures, the principal measure should be considered, while the negligible and sole measure should be used too.

The experiment indicated that with the factor level ascending from 0, the output growth changes remarkably and it achieved the maximum production when in the 0 level of experimental code value. With the growing of the experimental code value, the output has a dropping trend.

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