

# THE ASSIMILATING AND BENEFIT OF THE CHINESE REED CANARYGRASS (*PHALARIS ARUNDINACEA* L.) ON SOIL NUTRITION

Zhou Bihua, Qi Guang

Zhelimu Animal Husbandry College, Inner Mongolia, P.R. China

## ABSTRACT

The Chinese Reed Canarygrass (*Phalaris arundinacea* L.) is a fine perennial herbage of Gramineae. The wild ripened seeds were collected and sown on the experimental field of the Zhelimu Animal Husbandry College. The former plant of experimental plot is Chinese Crabapple and the cultivating layer is light loam with pH 8.7. The content of nitric N is 33.58 kg/ha, amino N 42.54 kg/ha, organic P 5.6 kg/ha, k 55.97 kg/ha. Clones were set up according to different compositions, that is N, P, K, WP, NPK, CK. the total amount of fertilizer is 23.8 g. The coefficient of absorbing and utilizing of N, P, K were analyzed at tillering stage according to M.K. Kaeomokb's formula. The contents of crude protein and fat were measured at tillering period. Fresh, dry and seed field were also measured at ripening stage. The result showed that the highest absorbing coefficient (Kn%) of N from soil is composition PK which is 12.36, while CK is 11.09 and composition K is 10.42. The highest absorbing coefficient (Ky%) of N from fertilizer is composition NPK which is 14.78, while CK is 11.09 and all the treatments are higher than control. The highest absorbing coefficient (Kn%) of P from soil is composition NP which is 19.52, while CK is 16.30 and all the compositions were higher than CK. The highest absorbing coefficient (Kn%) of K from soil is composition NP which is 19.2, while CK is 16.30 and composition N is 18.12 which is higher than CK. The highest absorbing coefficient (Ky%) of K from fertilizer is composition NPK which is 28.44, CK is 16.30, composition NK is 26.77, while composition K is lower than CK. The highest fresh and dry yield are composition NP with 46.79 t/ha and 33.89 t/ha respectively as compared with CK (30.82 t/ha and 20.54 t/ha). The output of all the compositions is higher than CK. The highest seed field was composition NK which is 0.232 t/ha, while CK is 0.075 t/ha. the composition NK is the highest treatment with the crude protein amount of 25.33%, while CK is 16.8%. The crude fat of CK is 5.4% while the compositions NK and N are both the highest with the percentage of 6.2. The content of crude fat in compositions K, PK, P were lower than CK. The experiment indicates that the yield and quality of Chinese Reed Canarygrass may be increased by employing fertilizer at proper proportions, and the utilizing efficiency of nourishment element from soil and fertilizer was also enhanced. This result provided the theory basis for the production and further study.

## KEYWORDS

Chinese Reed Canarygrass, *Phalaris arundinacea* L., utilized coefficient, crude protein, crude fat

## INTRODUCTION

*Phalaris arundinacea* is an indigenous species to China. It is productive in high crude protein content and palatable to animals. It is ideal parent material for hay crop breeding. In order to exploit this source and provide a scientific basis for large scale cultivation, this species was cultivated, and its absorption coefficient of N, P, K elements from soil and fertilizer was measured.

## EXPERIMENTAL FIELD

This experiment was conducted in the grassland breeding plots of Inner Mongolia Zhelimu Animal Husbandry College in China. Situation: latitude N 43°6", longitude E 122.2°, with an altitude of 178 m. Climate: mean annual temperature 6°C, annual precipitation 350-400 mm, hours of sunshine 2800-3700 hr/yr, frost free season

146 days/yr. Previous crop is fruit trees; soil texture in plough layer is light loam, pH 8.7, nitrate nitrogen content 18 ppm, ammonia nitrogen 19 ppm, K 25 ppm, organic phosphorus 2.5 ppm, and available phosphorus insufficient.

## MATERIALS AND METHODS

**Materials:** Seeds were collected from wild grown plants of Inner Mongolia in the Keerqing range. Clone was established 2 years after cultivation in April.

**Methods:** The clone was random arrangement: 3 replication, 8 treatments of N, P, K, NP, NK, NPK, PK and controls were set up. Each experimental plot was 1x10 m, spacing was 0.5x0.5 m, fertilizer application 33.8 g/plot by M, P, K elements.

Measurement: Following M.K. Kaeomokb's formula:

$$Kn = Bdy / Cu \times 100\%, Ky = BnP / Bx \times 100\%$$

## RESULTS AND ANALYSIS

### 1. The nitrogen utilization of *Ph. arundinacea*

#### a. Utilized coefficient of n in soil (Kn%)

Treatments	K	PK	P	CK
Kn%	10.42	12.36	11.43	11.09

The Kn% of PK treatment was the highest. The K treatment was the lowest, because there was plenty of K already in the soil, hence the application of K would cause the N and P to be relatively insufficient and reduce the absorption and utilization of N from soil.

#### b. Utilized coefficient of N from fertilizer (Ky%)

Treatments	N	NP	NK	NPK	CK
Ky%	11.26	11.12	10.94	14.78	11.09

The NPK treatment was the highest. It showed that NPK compound fertilizer increased the Ky% of N from fertilizer, supplement of more N and NP to plants improving the absorption.

### 2. The phosphorus utilization of *Ph. arundinacea*

#### a. Utilized coefficient of P in soil (Kn%)

Treatments	N	NK	K	CK
Kn%	18.63	19.30	12.68	16.30

The NK treatment was highest. The supplement of adequate N and K could improve the transformation and absorption of phosphorus.

#### b. Utilized coefficient of P from fertilizer (Ky%)

Treatments	NP	NPK	PK	P	CK
Ky%	19.52	19.30	19.52	18.50	16.30

The Ky% of NP is the highest. Because of the adequate K in soil, the supplement of N, P could improve the absorption

and utilized coefficient of phosphorus. All treatments were higher than control.

3. The absorption and utilization of potassium of *Ph. arundinacea*  
a. Utilized coefficient of K in soil (Kn%)

Treatments	N	NP	P	CK
Kn%	18.12	19.20	12.27	16.30

The Kn% of NP treatment was the highest. It showed that proper application rates of N, P could improve the absorption of potassium.

b. Utilized coefficient of potassium from fertilizer (Ky%)

Treatments	NK	NPK	PK	K	CK
Ky%	26.77	28.44	23.27	5.85	16.30

The Ky% of NPK was highest. It showed that given adequate N and P, and added a small quantity of K could increase the Ky% of K. But the Ky% of K treatment was much lower than control, it said that application of single K fertilizer to a soil with enough K would cause unfavorable effects.

4. The yields of fresh crop and hay of *Ph. arundinacea* (t/ha)

Treatments	N	NP	NK	NPK	PK	P	K	CK
Fresh crop	39.189	46.793	35.247	36.048	38.419	36.938	30.915	30.815
Hay	25.432	33.897	25.743	26.703	23.661	25.237	21.520	20.540

Both the fresh crop and hay yields of NP treatment were the highest among them, and yields of all treatments were higher than that of control.

5. Seed weight of *Ph. arundinacea* (t/ha)

Treatments	N	P	K	NP	NK	PK	NPK	CK
t/ha	0.105	0.141	0.165	0.162	0.232	0.177	0.177	0.075

6. The crude protein content of *Ph. arundinacea* (%)

Treatments	N	P	K	NP	PK	NPK	CK
%	22.83	18.40	18.34	19.75	17.51	18.92	16.80

7. The crude fat content of *Ph. arundinacea* (%)

Treatments	N	P	K	NP	NK	PK	NPK	CK
%	6.20	4.50	4.90	6.00	6.20	4.70	4.50	5.50

Both the N and NK treatments with the highest content.

From above results, it indicated that the application of proper mixed fertilizer could raise yields and quality of *Ph. arundinacea*.

## CONCLUSIONS

1. The application of P, K mixed fertilizer can improve the nitrogen absorption and utilized coefficient of *Ph. arundinacea* plants from soil/ and using N, P, K compound fertilizer can raise the nitrogen utilized coefficient from fertilizer.
2. The application of N, K mixed fertilizer can improve phosphorus absorption and utilized coefficient of *Ph. arundinacea* plants from

soil; and the N, P mixed fertilizer can raise the utilized coefficient from fertilizer.

3. The application of N, P mixed fertilizer can improve potassium absorption and utilized coefficient of *Ph. arundinacea* plants from soil; while the N, P, K compound fertilizer can raise the potassium utilized coefficient from fertilizer.
4. The application of N, P mixed fertilizer to *Ph. arundinacea* plants reaches the highest fresh crop and hay yields, while the N, K fertilizer application gets the highest seed weight per unit area.
5. The highest crude protein content of *Ph. arundinacea* plants comes from those applied with N, K mixed fertilizer, while the highest crude fat content plants from those applied with N, K mixed fertilizer or N fertilizer.