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STUDIES ON THE INFLUENCE OF CALCIUM AND MAGNESIUM ON GROWTH, YIELD AND QUALITY OF SEA ISLAND COTTON IN KERALA*

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Considerable research work has been carried out both in India and abroad on the agronomic problems connected with cotton. In Kerala work undertaken on manuring of cotton has shown that this crop responds well to NPK fertilizers (Kalam and George 1963). However the response of this crop to calcium, magnesium and the micronutrients has not been studied so far. Calcium and magnesium deficiency is quite prevalent in highly leached acid soils (Cooper and Donald 1949) and the soils of Kerala are EO exception to this. Williams (1937), Milan and Mehlich (1954), (Source, Cart and Kamprath 1965), Abdullaeva (1955) and Joham (1957) have studied the effect of calcium and magnesium on cotton yield elsewhere.

The present paper embodies the results of the investigations conducted on the influence of calcium and magnesium individually and in combination on the yield and the yield attributes of Sea Island cotton 'Andrews' (*Gossypium barbadense* Linn) which is grown in Kerala to the extent of about 20,000 acres.

Material and Methods

The studies were conducted by pot culture method during May to September 1965 in the Agricultural College Farm, Vellayani. Red loam soil of the college farm with following analytical values was used for the trials.

Total nitrogen	0·09 per cent
Available nitrogen	0·04 ,, ,,
Total phosphoric acid	0·16 ,, ,,
Available phosphoric acid	Very low
Total potash	0·10 per cent
Calcium (Ca 0)	0·28 ,, ,,
Magnesia (Mg 0)	0·09 , ,,
pH	5·70

N, P and K were applied at the rates of 40, 30 and 50 Kg/hectare based on the findings of Kalam and George (1963). Calcium and magnesium were given at the rate of 80 and 20 Kg/hectare respectively.

The treatments were 1. NPK, 2. NPK + Ca, 3. NPK + Mg and 4. NPK + Ca + Mg. Results of the treatments were assessed in terms of (a) Height of the plant at maturity, (b) Number of flowers per plant, (c) Number of bolls per plant, (d) Yield of *Kapas* and (e) Fibre characters. Each plant in each pot was studied for the different characters.

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Kalam, A. and George, C. M. 1963. Effect of date of sowing and combination of nitrogen, phosphoric acid and potash on the growth and yield of Sea Island Cotton. M. Sc. (Ag.) Thesis, Univ. Kerala.

Mazaera, M, M, 1957. The effect of magnesium fertilizers and the role of magnesium in plants, *Soils & Fert. 22* (1): 56.

Mc Cart and Kamprath, E J. 1965. Supplying calcium and magnesium for cotton on sandy low cation exchange capacity soils, *Agron. Jour. 57* (4): 404-406.

Williams, C B 1937. Study on starvation signs on tobacco and cotton. *Better Crops* (with plant food), *21* (10) : 14, 15, 40-41.

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The data presented in Tables 1 to 4 show significant increase in the height of the plant, number of flowers, number of bolls and yield of *Kapas* due to application of calcium. Combination of calcium and magnesium also records similar increase in the above characters. This may be due to the effect of calcium In decreasing the acidity of tha soil complex and consequent absorption of large quantities of other nutrients resulting in the increase of height, production of flowers and produc tion of bolls. An abundant supply of substrate calcium might also have enabled an efficient translocation of carbohydrate in the plants causing an increase in the yield (Joham 1957).

The significant results obtained in the cotton characters under study due to (he combined application of calcium and magnesium may also be attributed to the presence of calcium in their combination which has favourable influence on these characters.

Magnesium application individually has no favourable effect on the plant characters under study other than controlling the incidence of red leaf disease which has been observed in other treatments without magnesium. Absence of response for magnesium application may be attributed to the tendency of magnesium getting accumulated in the seeds (Mazaera 1957) with no positive effect on these characters.

The response noticed on fibre characters such as fibre length seen in Table 5 may be due to the effect of calcium and magnesium on the acidic soils (Williams 1937, Abdullaeva 1955),

Summary

Calcium application increases the height of cotton plant significantly, whereas magnesium has no influence on it. Calcium alone and in combination with magnesium increase the number of flowers and bolls produced. There is significant increase in the yield of *Kapas* due to the application of calcium alone and in combination with magnesium. However, magnesium alone does not have any significant effect on the yield. In fibre characters, response is noticed in the fibre length by the application of these elements.

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References

Abdullaeva, K. 1955. The effect of boron and calcium in the development and yield of cotton. *Soils & Fert. 14:* 209.

Cooper, H. P. and Leroy Donold. 1949. *'Hunger Signs in Crops'* The Natural Fertilizer Association, Washington, D. C.

Joham, H. E. 1957. Carbohydrate distribution as affected by calcium deficiency in cotton. *Pla. Phy. 32* (2): 113.

Table 3

Effect of calcium and magnesium on the number of bolls produced by the plant

Treatments	Mean number of bolls
NPK	6
NPK + Ca	10
NPK + Mg	7
NPK + Ca + Mg	8·50

C. D. (at 5 per cent) : 2·29

$\overline{T_2 \quad T_4}$ $\overline{T_3 \quad T_1}$

Table 4

Effect of calcium and magnesium on yield of *Kapas*

Treatments	Mean yield of *kapas* in gm
NPK	11·7
NPK + Ca	14·97
NPK + Mg	10·023
NPK + Ca + Mg	17·91

C. D. (at 5 per cent) : 1·607

$T_4 \quad T_2 \quad T_1 \quad T_3$

Table 5

Effect of calcium and magnesium on fibre characters of cotton

Treatments	Mean fibre length (mm)	Mean fibre weight (milli-tex)	Maturity co-efficient	Bundle strength (gm/tex)
NPK	32·0	130	0·70	44·0
NPK + Ca	32·9	111	0·63	42·0
NPK + Mg	30·0	106	0·62	44·0
NPK + Ca + Mg	33·0	127	0·69	45·0

Results and Discussion

The results are given in Tables 1 to 5

Table 1

Effect of calcium and magnesium on height of cotton plant

Treatments	Mean height in cm
NPK	35·25
NPK + Ca	43·50
NPK + Mg	36·75
NPK + Ca + Mg	41·00

C. D. (at 5 per cent) : 5·80

$\overline{T_2 \quad T_4}$ $\overline{T_3 \quad T_1}$

Table 2

Effect of calcium and magnesium on the number of flowers produced by cotton plant

Treatments	Mean number of flowers
NPK	7·00
NPK + Ca	11·25
NPK + Mg	9·75
NPK + Ca + Mg	11·00

C. D. (at 5 per cent) ! 2·96

$\overline{T_2 \quad T_4}$ $\overline{T_3 \quad T_1}$